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Influences on Individuals to Enrol in Undergraduate Technology Teacher Education Programs in Australia

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Influences on individuals to enrol in undergraduate technology teacher education programs in Australia

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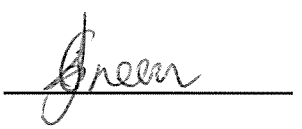
Submitted on 31/10/2001

Supervisors' signatures 

Examiner's signature _____

Declaration

I declare that all material contained in this thesis submitted to Avondale College is my own work, or fully and specifically acknowledged wherever adapted from other sources. I understand that if at any time it is shown that I have significantly misrepresented material presented to the College, any degree or credits awarded to me on the basis of that material may be revoked.

Signed: 

Dated: 31 October, 2001

Dedication

Dedicated to the lecturers of the Avondale College Industrial Technology and Design Department - Owen Cowley, Nigel Petersen and Lyn Butcher for encouraging me to accept this challenge.

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ABSTRACT

Within the context of a wide-spread technology teacher shortage, this study focused on undergraduates enrolled in technology teacher education programs (TTEPs) in Australia. The aim of the study was to ascertain the basic demographics of the enrolled student population, and to examine factors that were linked to the decision of individuals in choosing to become technology teachers.

The literature search identified useful Australian studies which gave an overview of recent TTEP enrolment trends in tertiary institutions.

A questionnaire was constructed as part of a quantitative research design and then distributed to Australian universities that were offering TTEPs at the undergraduate level. From this data the demographics of the respondents were ascertained. To produce a causal model, path analysis was employed using a backward stepwise regression process to weight the dependencies of the model.

The study found that enrolees in TTEPs represent a diverse group, with some universities having a distinctive clientele profile.

The study identified a "desire to teach" as the most positive influence on individuals' decisions to enrol in a TTEP. The causal model indicated that it is the fostering of hobbies and interests, and the climate, program and personnel of the secondary school that has the potential to influence individuals' decisions to become a technology teacher.

CHAPTER 1

THE NATURE AND SCOPE OF THE STUDY

Introduction

The regular supply of qualified teachers plays an essential part in the ongoing socio-economic growth of developed countries. With the restructuring of the binary tertiary sector (Colleges of Advanced Education and Universities) in Australia, into a unified system - at the beginning of the 1990's, teacher education became the responsibility of universities. It is the faculties of teacher education that now service the need for secondary and primary teachers in the various states and territories, and which contribute to the preparation of effective teaching graduates.

Statement of the Problem

Presently there is an international shortage of teachers within the field of technology education (Wright & Custer, 1998; Ritz, 1999). This shortage also effects Australian schools (NTSADWPC, 1998; Baird 2001). Given that previous short term solutions such as attracting overseas teachers to Australia in required numbers, seem no longer viable in a decreasing global supply of teachers, it is apparent that there is a need to increase the numbers of pre-service teachers in the field of technology education. However, little is known about those factors that influence Australians to become technology teachers.

Literature which deals with factors that influence individuals to become technology teachers is almost non-existent, with the exception of an American study by Wright and Custer (1998) who found that encouragement from, and admiration of technology teachers, as well as an enjoyment of technology subjects were among the strongest influences leading Americans to become technology teachers. This research also pointed out that the most frequently cited factors were not necessarily the most influential.

The Aims of the Study

The present study aimed to build on the research of Wright and Custer (1998) through collecting data in an Australian context, and to develop a causal model which identified and permitted theorising about factors that influence individuals' decisions to become technology teachers. More specifically, the researcher planned to achieve this through employing a strategy that included:

- developing a causal model and identifying an "ultimate dependent variable",
- collecting data through the utilisation of a survey/questionnaire instrument, and by
- employing multiple linear regression analysis, and testing the constructed model against the data.

The study also sought to form a demographic profile of undergraduates presently enrolled in technology teacher education programs.

Significance of the Study

This study is important because it should provide insights about the background of potential undergraduates, and suggest emphases in and direction for the marketing of technology teacher education. At a time of a looming technology teacher shortage, the study appears both timely and relevant. The study is also significant because, as far as is known, it is the first study in Australia which has investigated the posited research questions.

The study is also significant because it makes a useful contribution to the technology teacher education knowledge base, and indirectly to the clients whom it serves: students, education systems, and the community at large.

Research Questions

The following research questions guided the collection of data in this study:

1. What are the basic demographic characteristics of the technology teacher education student population in Australia?
2. What factors influence individuals to select, and enrol in technology teacher education programs?

Delimitations

There is a wide range of undergraduate degree programs and post-graduate studies aimed at preparing technology teachers. For the purpose of simplicity and the need to keep this study to a manageable size the researcher decided to focus the present study solely on undergraduates.

Limitations

The semester program structures of the universities involved in the present study were considerably different, which meant that holidays and practicums restricted the number of undergraduates that were able to receive a questionnaire and participate in the study.

Assumptions

Because ideal conditions do not exist in research, the researcher anticipated that there would not be a 100% response rate. The assumption was made by the researcher that the responses received would be a representative sample of the total number of technology teacher education undergraduate students in Australian tertiary institutions.

The questionnaire was developed to maximise clarity for the respondents and to minimise confusion and ambiguity. It was assumed that the questions were interpreted by participants according to the researcher's intentions.

Definition of Terms

The terms listed below are used in the study to convey the following meanings:

- *Endogenous variables* - Those variables whose variance are partly determined by exogenous variables included in the causal model and partly by factors which are external to the model. Endogenous variables mediate between exogenous variables and the ultimate dependent variable.

- *Exogenous variables* - Those background variables whose entire variance is determined by factors external to the causal model.
- *Ultimate Dependent Variable* - The one dependent variable whose variance is largely determined by a combination of endogenous and exogenous variables.
- *Path analysis* - The process by which multiple linear regression is employed to weight the dependencies of a causal model.
- *Technology teacher* - A teacher within the technology field who teaches subjects under the Technology and Applied Studies (TAS) umbrella in NSW, or its equivalent in other Australian states and territories.

Summary of Succeeding Chapters

Chapter two examines relevant literature concerning the global shortage of teachers, and shortage of technology teachers in the Australian context, specifically. It surveys the program components and enrolment figures in Australian universities currently offering technology teacher education programs. The chapter deals with conceptual building blocks from Wright's and Custer's (1998) study and the work of Fishbein and Ajzen (1978) to develop a causal model of influence. Chapter three describes the methodology employed in the study and outlines the process of analysis of the data, with reference to the causal model. Chapter four describes the respondents and creates a demographic profile of them. The results of the data analysis are presented, the causal relationships described, and a path diagram developed. The chapter concludes with a discussion of the findings. Chapter five presents conclusions in relation to the findings, the literature,

and posited research questions. It then mentions the limitations of the study and recommends areas for further investigation and study.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

This chapter looks at the demand and supply of teachers generally, and that of technology teachers in particular. The focus is on the shortage of those teachers within the technology field who teach subjects under the Technology and Applied Studies (TAS) umbrella in New South Wales, or its equivalent in other Australian states and territories. This includes the subjects that traditionally have been taught by Industrial Arts and Home Economics teachers. However, as a result of the 'overhaul' during the 1990's the umbrella has spread to cover subjects such as Design and Technology, Industrial Technology, Technics, Food Technology, Computing Studies, Agriculture, and Engineering Science (Williams, 1993).

Next, attention is given to undergraduate technology education programs, the Australian tertiary institutions that offer them, and the respective enrolment trends over the past eight years. The chapter continues with a brief examination of factors that influence students to enrol in technology education degree courses and concludes with a proposal for a causal model of influence.

General Teacher Shortage

Global

In the past, in order to fill any gap between the supply and demand for qualified teachers, Australia has been able to draw on an overseas pool of "available" teachers (The Guardian, 1999). Presently, there is a *global* shortage of qualified teachers (Cooper & Boyd, 1997; Weston, 1997; Daugherty, 1998; Fritz, 1998; Litowitz, 1998; Wright & Custer, 1998; Ritz, 1999, Baird 2001). As a result it is becoming increasingly difficult in Australia, as elsewhere, to fill vacant teaching positions.

United States of America

During 1998, President Bill Clinton in an attempt to combat the teacher shortage in the USA, launched federal efforts to hire 100,000 qualified teachers. However, only a third of that target was met over a two year period (Longley, 2000). The U.S. teacher shortage is seen as a result of numerous factors, including transfer to other careers, and the retirement of teachers from the "baby boom" era (FTPA, 1999).

United Kingdom

In the UK, the BBC recently highlighted the need to find an additional 10,000 teachers in England and Wales, as the increase in the number of student enrolments was expected to reach 180,000 within the next four years (TCEB, 2000). Cabinet ministers admitted that the number of unfilled teaching positions reached 2,660 by January last year (The Socialist Worker, 2000).

There were 1,000 fewer applications for secondary teacher education enrolments than at the same time the previous year, and 20 percent less than in 1998.

Canada

It is evident that a teacher shortage also looms in Canada. Increasing retirements, and reductions in the number of job applicants, caused in part by teaching graduates choosing other careers, have contributed to the problem (The Globe and Mail, 1999.). The Ontario College of Teachers estimates that more than 41,000 of Ontario's 175,000 teachers will retire in the next five years and it expects another 78,000 to follow suit in the next 10 years. That scenario was expected to be repeated across the country.

Australia

In Australia, secondary schools appear to be faced with an expected secondary teacher shortage of 36% by 2004, according to media reports (The Age, 2000). Also, a spokesperson for the Promotion of Public Education (POPE) estimated a short fall of 25% in NSW alone within the next 5 years (The Guardian, September, 1999) and condemned the NSW Education Minister, John Aquilina, for a lack of funds for training teachers.

In the lead-up to the 1999-2000 New South Wales State Budget, the NSW Teachers Federation highlighted the shortage of teachers. However the budget failed to address the problem (The Guardian, 1999), and it is believed

that the situation will become worse as a result of some staffing cutbacks. Data produced by Preston (1997) relating to the secondary teacher demand and supply projections for Australia from 1996 through until 2003, reinforce the validity of the forecast teacher shortfall (See Table 2.1). In response to this report, the Department of Education, Employment, Training and Youth Affairs (DEETYA) agreed that there would be a shortage, but disputed the level and extent of the teacher shortfall (Parliament of Australia: Senate Committee, 1998). Preston (1997) defended her figures citing the increasing numbers of teacher retirements, the changing economy, and the decreasing numbers of teachers available for both private and public schools, to back her claims.

Table 2.1

Projected Demand for and Supply of Secondary Teachers

in Australia for the Period 1996 to 2003

Supply and Demand	Years of Forecast						
	1996	1997	1998	1999	2000	2001	2002
Total graduates (demand)	3,854	5,434	6,468	7,054	7,469	7,877	8,703
Total graduates (supply)	5,350	5,283	4,762	4,827	5,498	5,574	5,522
Surplus/shortage (number)	1,496	-151	-1,706	-2,227	-1,971	-2,303	-3,181
Supply as % of Demand	139%	97%	74%	68%	74%	71%	63%

(Parliament of Australia: Senate Committee, 1997)

Technology Teacher Shortage

The worldwide general teacher shortage has also on impacted the technology education field. In particular, attention has focused on tertiary institutions and their falling teacher education enrolment and graduation numbers. There is a widespread concern for the future of technology education in secondary schools in the United States, the United Kingdom and Australia as the numbers of graduates in technology education are insufficient to meet demand.

Weston (1997) reports on a research project conducted in America regarding future employment opportunities for technology teachers. Surveys ascertained the current number of technology teachers employed and the projected number of vacancies for the years 1996, 1999, and 2001 across the country (See Table 2.2). The data received indicate that between 1996 and 2001, the projected combined number of technology teacher vacancies by 2001, would total 13,089 for Middle and High Schools. These data (See Table 2.2), together with a greying workforce and a 22% decrease in the number of graduates since 1995, indicate a growing shortage of qualified technology teachers in the USA.

In the United Kingdom recruitment figures for initial technology teacher education (Banks, 2000) show a shortfall of 41%, or 1176 enrolments for the target set in the 1999/00 period (See Table 2.3). The new target for the years 2000/01 was set at two thousand new technology teacher recruits, which is

Table 2.2

Projected Number of Technology Teacher Vacancies

in Middle and High Schools across the U.S.A.

for the Years 1996,1999 and 2001.

Projected Number of Vacancies						
	Middle School			High School		
Year	1996	1999	2001	1996	1999	2001
Total	1,549	2,031	2,456	1,684	2,338	3,031

(Weston, 1997: 8, 9)

Table 2.3

Actual Numbers of Teacher Education Recruitment

in the U.K. According to Subject Specialisation

for the Period 1999 - 2000

Recruitment	*1999/2000 recruitment*	*Percentage change on 1998/1999 recruitment*	*1999/2000 recruitment compared to target (%)*	*Shortfall (-)/ excess compared to target*
Secondary:				
Technology	1,693	1	-41	-1,176
Maths	1,301	16	-23	-389
Science	2,353	3	-2	-48
History	816	-9	3	24
Total Secondary	13,852	-4	-17	-2,837
Total Primary	11,839	3	+1	117
Grand total (all subjects)	25,691	-1	-9	-2,541

(Banks, 2000: 2)

30% less than the 1999/00 target. What is most disturbing, as indicated by the other data, is that this drop appears to relate only to Technology, with the target numbers for other secondary subjects being increased by at least 10% (See Table 2.4).

In Australia, some reports indicate that technology teachers are being 'lured' out of retirement to combat chronic shortages (Hancock, 2001). Available data, however, indicate that a total of 603 technology teachers was on the NSW Department of Education and Training (NSWDET) waiting list for permanent appointment in September 1998 (Beard, cited in Gibson and Barlow, 2000). This appears to weaken the argument that there is an under-supply of technology teachers, specifically in NSW. A simplistic interpretation of the data is cautioned for the following reasons:

- Demographic constraints – Some people are not prepared to accept appointment to isolated areas of the state.
- Accreditation issues – Many teachers seeking re-employment in NSWDET are no longer considered appropriate for re-accreditation in some subjects. This is particularly important when considering Design and Technology.
- Employment status – Many teachers appearing on the NSWDET waiting lists already hold positions in other school systems or in industry. They are reluctant to accept (promotion) appointments if it means having to resign existing satisfactory employment for less attractive geographical locations.

- School based issues – There are some schools and regions in NSW with a "reputation". These schools are notoriously difficult to staff. This is evidenced by NSWDET's intensive schemes to attract teachers to these schools. Many individuals on the waiting list for appointments would be as reluctant as permanent staff to accept positions in these locations (Gibson and Barlow, 2000).

According to the National Teacher Supply and Demand Working Party Conference (NTSADWPC) of Education System Chief Executive Officers (1998), there is a need for technology teachers, especially in the Industrial

Table 2.4

A Comparison of Technology Teacher Recruitment Targets in the U.K. for the Years 2001- 2003 and 1999 - 2000

Recruitment	*New target for 2000/01 and indicative targets for 2001/02 and 2002/03*	*Percentage change on 1999/2000 target*	*Change since 99/00*
Secondary:			
Technology	2,000	-30	-857
Maths	1,850	10	168
Science	2,690	13	309
History	900	14	111
Total secondary	16,615	0	0
Primary	13,100	9	1,082
Grand total (all subjects)	29,715		

(Banks, 2000: 2)

Arts area, throughout rural Australia, with the exception of the ACT and Victoria (See Table 2.5).

It is interesting to note that despite the majority of technology teacher education institutions being located in NSW, there is still a need for technology teachers in rural and metropolitan areas of that state. Current demand is strongest in areas of high population growth, such as western and south-western Sydney and in rural locations (McGhee, 1999).

In Queensland, despite the encouraging number of enrolments in the B.Tech.Ed. program at Griffith University, the supply of technology teachers is still not keeping up with the demand, even on a replacement basis (See Appendix I). This means that even if technology subjects were not being introduced in new schools, Queensland teachers who were retiring, or moving to a new career could not be fully replaced by new graduates.

Table 2.5

Where are Technology Teachers needed in Australia?

States	NSW	Vic	SA	Tas	WA	NT	ACT	Qld
Need Location	M, R	-	M, R	R	M, R	M, R	-	R

Code: M = Metropolitan R = Rural

(NTSADWPC, 1998)

The situation is even more serious in the Northern Territory (NT) as presently there is no tertiary institution in the NT that supplies technology teachers. As a result, the NT is vulnerable to effects of shortfalls interstate (Parliament of Australia: Senate Committee, 1998).

In response to the current shortage of technology teachers a number of strategies have been implemented by NSWDET and at least two Catholic Education Offices (CEO) - Sydney and Parramatta. Their strategies to change the present situation include:

1. A comprehensive promotion campaign throughout the secondary school sectors encouraging school leavers to consider a career as a technology teacher.
2. Development and implementation of retraining programs for existing teachers.
3. NSWDET and CEO sponsored Diplomas of Education in Technology and Applied Studies.
4. Programs in technology teacher education for people in BHP (now "BHP Billeton") who face redundancy.

(Gibson & Barlow, 2000)

The impact of the promotion aimed at the school leaver is yet to be assessed. However, according to Gibson and Barlow (2000), the University Admission Centre (UAC) numbers for the technology teacher education program at Australian Catholic University were up by approximately 20% for

the year 2000. The programs mentioned in points 2. and 3. (above) have contributed to the supply pool of technology teachers in NSW since 1999, while some graduates from the program outlined in point 4. also added to the supply, commencing in 2000.

Australian Universities Participating in Technology Teacher Education

Program Offerings

In 1995, Williams (1996) surveyed Australian tertiary institutions offering a four-year Bachelor of Education degree in Technology (also known as "Design and Technology", "Technological and Applied Studies", and "Technology Education"). The institutions that responded were: Australian Catholic University; Avondale College; Edith Cowan University; Newcastle University; University of South Australia; University of Sydney and University of Tasmania.

Over a period of 5 years there appears to have been a spate of program closures. Just prior to Williams' survey in 1995, Curtin University in Western Australia had officially closed its technology teacher education program (See Appendix II), and by November 1998, "associated" B.Ed. courses were discontinued at the University of Western Sydney, Australian Catholic University, the University of South Australia and also the University of Tasmania (Fritz, 1998). Before the end of the decade, a similar fate would befall Avondale's program with the announcement that its Industrial Technology degree program would be phased out.

The tertiary institutions in New South Wales where undergraduate programs in technology education still operated were:

Australian Catholic University (B.A./ B.Teach)

Avondale College (B.Ed.)

Charles Sturt University (B.Ed.)

Southern Cross University (B.Tech.Ed.)

University of Newcastle (B.Design/B.Teach)

(Gibson & Barlow, 2000)

Although New South Wales has the majority of technology teacher education institutions in Australia at an undergraduate level, tertiary institutions in other states also graduate technology teachers. These are Edith Cowan University (B.Ed.) in Western Australia, and Griffith University in Queensland (B.Tech.Ed.). Specific information concerning undergraduate degrees in technology education at the University of Tasmania and the University of South Australia is presently not available. Thus these institutions have not been included in the review of programs below.

Education Degrees in Technology: A Review of Undergraduate Programs

Australian Catholic University (A.C.U.) discontinued its B.Ed (Secondary) TAS program by 2000, but had earlier introduced a B.A./B.Teach. (Technology) degree in 1997 (See Appendix III). This course was designed to give students the option to take Technology as either a major or minor field of study, with the fourth year of study being wholly given to education studies.

This gives students who successfully complete their third year the opportunity to decide whether to teach or to exit with a "stand-alone" Bachelor of Arts award (Fritz, 1998).

Avondale College (Cooranbong campus) has provided a four-year B.Ed. (Home Economics/Design and Technology) as well as a B.Ed. (Industrial Technology and Design) program for over 20 years. During the past four years an Honours degree option has also been available. Since the data by Gibson & Barlow (2000) were presented, Avondale College has decided to phase out its Industrial Technology degree as current students complete their studies (See Appendix IV). However, the B.Ed. (Home Economics/Design and Technology) is still being offered and remains unaffected.

Southern Cross University (Coffs Harbour campus) commenced its B.Ed. (Technologies) in 1999, and since then has revised its program to specifically meet key recommendations of the National Innovation Summit Report (2000) in the form of a Bachelor of Technology Education. All students complete a major in Design and Technology and a minor in Information Technology. In addition, study majors can be selected from Information Technology and Multimedia, Food Technology and Tourism Management, or Wood Technics and Engineering Studies. For students who achieve a high grade point average, an Honours option is also available, which then opens the way for doctoral studies without the need to complete a masters degree (SCU, 2001).

Charles Sturt University (Wagga Wagga campus) began its B.Ed. (TAS) in 1997 (Gibson & Barlow, 2000) with major areas of study in Agriculture, Computing or Food Technology, and minors available in Agriculture, Computing, Food Technology or Industrial Arts. As a part of the course, core studies are provided in Design, Computing, and Materials Technology. Training at Charles Sturt University will qualify a student as a vocational education teacher, as well as a technology teacher (CSU, 2000).

In 1998, Newcastle University was offering a double degree, which combined a Bachelor of Teaching with a Bachelor of Design with a major in Design and Technology and Industrial Technology (See Appendix V). Earlier in 1997, through negotiations with the NSW Department of Education and Training and BHP (Newcastle), Newcastle University had also developed two programs specifically for BHP workers made redundant. The B.Ed. program enrolled 54 participants in 1998, and upon its successful implementation, the University of Wollongong has worked with the University of Newcastle to commence a similar program for the retrenched workers from BHP (Port Kembla). In 1999 this course enrolled 10 students, with an expected increase in the following years (Gibson & Barlow, 2000).

Griffith University has made available a Bachelor of Technology Education (B.Tech.Ed.), which is the only undergraduate technology education course in Queensland that prepares teachers for careers in manual arts/technology education and vocational studies for secondary schools. It is a four year

course which offers flexible career options, in that students who undertake it also have the opportunity to pursue studies which explore the links between technology education, training and safety. Students may also select a second teaching area. This course was developed to prepare technology educators to teach the manual arts area in secondary schools and the emerging study of technology education. Honours has been made available in this course with students required to undertake specific studies in their third and fourth years of the Bachelor of Technology Education program (GU, 2001).

Edith Cowan University (ECU) is the only tertiary institution that provides technology teacher education in Western Australia (See Appendix II). It provides a four year B.Ed. (Secondary), with specialisations available in Educational Computing and Interactive Multi-Media, Design and Technology Education, and Home Economics. However, the specialisations: Educational Computing and Interactive Multi-Media are only available as a minor, while Home Economics Education is offered as a major only, whereas Design and Technology is available as a specialist major or minor (ECU, 2001).

Canberra University commenced its Bachelor of Education (Secondary) Design and Technology course in 2001 and is offering a technology major specialisation (at University of Canberra) and a minor (at Canberra Institute of Technology). This enables undergraduates to develop understanding and expertise in Engineering, Information Technology and Food Technology (See Appendix VI).

University of Western Sydney (UWS, Penrith) commenced its B.Ed. (Secondary Technology) in 2001 with a very small intake. During 2001, UWS was undergoing major restructuring with every education program being reviewed, including the brand new B.Ed. (Secondary Technology) degree. As a result, new information is expected to become available on the UWS website, and from any of its Campus Service Centres, sometime in the near future. The students enrolled in the B.Ed. (Secondary Technology) during 2001 will change to the revised course in 2002. Essentially, it has been a 'repackaging' of existing Education, Engineering Design, Business and IT units. It is the aim of the program to prepare graduates to teach Design and Technology and at least two TAS electives such as Industrial Technology, Engineering, Technics and Technical Drawing. It is also planned that other TAS specialisations will be offered in the future (See Appendix VII).

The University of Sydney anticipated the commencement (in 2001) of a new undergraduate degree - Bachelor of Education (Secondary: Design and Technology). However, during the first year of the degree, students study at various TAFE colleges around NSW (See Appendix VIII).

Enrolment Trends

Williams' (1996) survey, facilitated by a grant from the Technology Education Foundation of Australia (TEFA) was conducted at the end of 1995. The research produced data showing first year intakes into technology teacher

education programs across Australia, between 1993 and 1995. Griffith University in Queensland was the only institution not to respond to this survey, which may have been a limitation of the research. Hawthorn University, although not offering degrees at an undergraduate level for technology teaching, was included in the survey, because it was the only Victorian institution that was providing technology teachers through postgraduate studies.

Table 2.6 indicates that there was a slight decline in the overall first year enrolments in technology teacher education courses at the University of South Australia and Newcastle University between 1993 and 1995. The enrolments at other institutions such as the University of Tasmania, Avondale College and Hawthorn remained relatively constant, while at the University of Sydney and the Australian Catholic University enrolments fluctuated with no clear trend apparent during this period. Edith Cowan University was the only institution to make considerable gains during this period, by not experiencing any decrease in first year enrolments.

Gibson and Barlow (2000) conducted a survey similar to that of Williams. However they limited their research to New South Wales tertiary institutions and collected data on more recent technology teacher education enrolment trends (see Table 2.7).

Table 2.6

Technology Teacher Education Programs

First-year Student Intake Numbers, 1993 – 1995

	Year of Intake		
Institution	1995	1994	1993
Australian Catholic	24	16	20
Avondale	6	4	7
Edith Cowan	38	18	18
Hawthorn	15	16	15
Newcastle	26	29	37
South Australia	21	22	27
Sydney	50	68	58
Tasmania	13	12	14
Total	193	185	196

(Williams, 1996: 14)

Four years after Williams' (1996) study, Gibson & Barlow (2000) report the phasing *out* of the University of Sydney program, and the phasing *in* of the Newcastle University (1997), Charles Sturt University (1997) and Southern Cross University (1999) programs. These data indicate that all institutions, which were not phasing out technology programs, experienced substantial growth in first year enrolments between 1997 and 1999, with the exception of Avondale College.

It is evident from the data that during the period under review there has been growth in student enrolment numbers in undergraduate technology teacher education programs across NSW since 1997, and despite the closing down

Table 2.7

Undergraduate Technology Teacher Education Enrolments

1997-1999

Program Year		1	2	3	4	Total
Institution	Year					
Australian Catholic University	1997	20	10	8	8	46
	1998	40	18	8	8	72
	1999	50	36	16	7	109
Avondale College	1997	8	6	5	4	23
	1998	5	7	6	5	23
	1999	6	5	7	6	24
Charles Sturt University	1997	12	-	-	-	12
	1998	27	7	-	-	34
	1999	30	20	7	-	57
University of Newcastle	1997	9	-	-	-	9
	1998	18	8	-	-	26
	1999	22	16	8	-	44
University of Sydney	1997	46	31	30	45	152
	1998	-	35	26	30	91
	1999	-	-	28	26	54
Total		293	199	149	139	811

(Gibson & Barlow, 2000)

of some programs, the newer ones appear to be capable of holding the numbers, and even increasing them.

Influences on Individuals in Becoming Technology Teachers

As previously mentioned, NSWDET and the CEO have commenced a campaign in NSW secondary schools that aims to encourage and persuade

school leavers to take up a career in technology education. Thus the market place has been able to provide some information about what forces are at work in influencing individuals to enter technology teaching. In contrast, the literature was able to provide very little information.

Despite a comprehensive search of the literature it was difficult to locate research that dealt directly with the Australian situation and identified factors that influence undergraduates to enrol in current degree programs.

In an American study, Wright & Custer (1998) researched factors influencing students in the USA to become technology teachers. They used a modified instrument adapted from Devier (1986) and Wright (1992). This revised instrument was reviewed by the International Technology Education Association (ITEA), and re-examined by a panel of experts comprised of technology teacher educators.

In the Wright and Custer (1998) questionnaire, the respondents were asked to indicate whether they felt an item was a factor in their decision to become a technology teacher and if so, to rate its degree of influence. A five-point Likert-type scale was used on all items, with "1" representing "Not Influential" and "5" representing "Highly Influential."

"Personal interests or hobbies" was cited most frequently as an influential factor by respondents, in their decision to become a technology teacher. The

next most frequently cited influence was taking a "High school industrial arts/technology education course" and "Admiration of a high school industrial arts/technology education teacher as a role model." "Extra-curricular IA/TE activities" and "Encouragement by high school IA/TE teacher" were the next most frequently cited "influential" factors. It is interesting to note that Wright and Custer (1998) point out that the most *frequently* cited factors were not necessarily the most *influential*, however.

The mean rating of the perceived influence by those students who indicated the factor was influential, indicated that there was almost a three-way tie for the *most* influential factor. Both "Encouragement from high school industrial arts/technology education teacher" and "Encouragement from other community personnel" were rated as the most influential factors, followed closely by "Encouragement from a college/university professor." Wright and Custer (1998) concluded however, that "Encouragement from other community personnel" was essentially a non-factor since it was cited by only two percent of the sample. The factors rated as least influential were "Encouragement by university coach" and "Secondary school IA/TE extra-curricular activities."

It was suggested that there was little that could be done to capitalise on the students' personal hobbies in terms of recruitment, except to highlight the positive relationship between enjoyment of one's daily job when it coincides with personal hobbies. Wright and Custer (1998) suggested that in relation to

recruitment, high school technology teachers could be actively advocating technology teaching as a rewarding career option, since their encouragement was cited by nearly one-third of the sample. This together with student enjoyment of technology subjects and the admiration of a high school technology teacher as a role model, are clearly factors that the profession has control over.

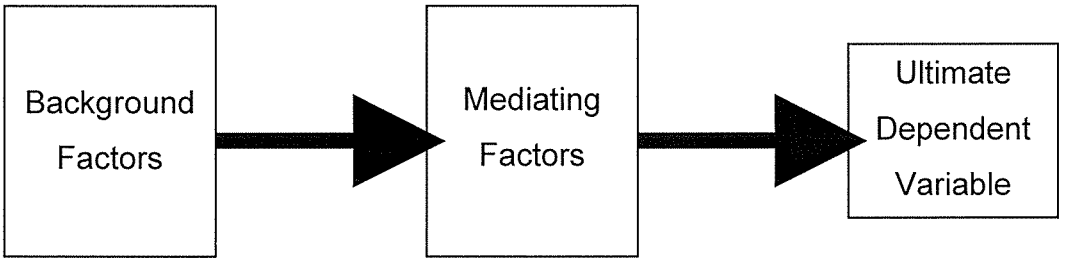
A Causal Model of Influence

The aim of this study was to identify those factors that influence individuals' decisions to become technology teachers. In dealing with research into factors that influence decisions, Fishbein and Ajzen (1975) argue that intention is a major indicator of behaviour. In turn they suggest that intention does not spontaneously arise without cause. It is the cumulation of background factors, which shape beliefs and attitudes, which eventually create an intention to act. For the purpose of this study the action is the "enrolment in technology teacher education programs" and the intention that causes this action is the "desire to become a technology teacher."

This line of reasoning leads to the exploratory causal model illustrated by Figure 2.1 in which the desire to teach is the ultimate dependent variable. In this model, the background factors are exogenous in nature since they are beyond the control of the researcher, but they can be measured. These factors include characteristics such as age, gender, rural or city origin, and parental employment.

Figure 2.1

Three Stage Causal Model



The mediating factors are presumed to be those identified by the literature as influencing the ultimate decision. According to Wright and Custer (1998) they include factors arising from school and community interaction, and such personal interests as hobbies. Measures of these influential factors were entered into the model as endogenous mediating factors.

It was assumed that such a model is uni-directional, and therefore influence flows from the background factors, through mediating factors to the "desire to teach." It was also assumed that the influences of these factors are cumulative. As such, the model complies with Pedhazur's (1982) criteria for the use of multiple linear regression analysis to weight the various dependencies of the postulated causal model.

Chapter Summary

There is a teacher shortage across the world. Despite the initiatives of governments, recruiting teachers for classroom positions has become

increasingly difficult. Australia has not been exempt from this phenomenon, especially within the Technology teaching fields. To supply the "technology teacher pool", a number of Australian universities offer a variety of undergraduate degrees within technology education. Although enrolment trends appear to be improving at some universities, the numbers are still insufficient to supply technology teachers for all unfilled teaching positions.

Australian literature dealing with factors that influence individuals to become technology teachers is extremely scarce. However, some American studies proved to be useful in identifying significant factors that influenced undergraduates' decisions to enter technology teacher education programs in the USA, and in indicating implications for recruitment strategies.

Also in this chapter an exploratory causal model was postulated in which those influences identified by the Wright and Custer (1998) study became the mediating factors. The next chapter sets out the methodology and the research design for the study.

CHAPTER 3

METHODOLOGY

Introduction

This chapter sets out the general research design for the study. It outlines how the data was collected. It describes the instrument employed in the study, summarises the ethical procedures and protocols that were followed by the researcher and explains the nature of the data analysis.

Population Sample

There is a limited number of Australian universities that offer undergraduate degrees in technology teacher education. Eight tertiary institutions across Australia with an enrolment of 833 technology education undergraduates participated in this study. The universities/tertiary institutions which participated were Avondale College, Australian Catholic University, Southern Cross University, Newcastle University, Charles Sturt University, Canberra University, Griffith University and Edith Cowan University (For a more detailed background description of participating institutions see Appendix VI).

Questionnaire Construction

The questionnaire employed in the study included many attitudinal items adopted from the instrument used by Wright and Custer (1998). However, many of the items used in the American study, were reworded in order that Australian students would more readily understand them.

The first section of the questionnaire used in this present study contained 28 of these attitudinal items, which allowed participants to respond on a four-point Likert scale. The items generally probed the social influences that may have contributed to an individual's decision to become a technology teacher.

Section two of the questionnaire was designed to ascertain the respondents' demographic backgrounds.

The researcher considered the constructed questionnaire to have strong content validity. The justification for this reasoning being

> ...that the instrument measures what it seeks or purports to measure because there was a rational, and ideally an empirical, basis to the selection of the actual content (Fox, 1970: 370).

Ethical Procedures and Protocols

Before implementation of the survey could proceed, a proposal for the study together with a copy of the questionnaire instrument was submitted to the Avondale College Social Sciences Ethics Committee in order to meet set ethical criteria (See Appendix IX). Following the Committee's approval, requests to distribute the questionnaire were forwarded to all Australian university faculties that were offering technology teacher education degree programs at an undergraduate level. The hand/e-mailed material consisted of a covering letter (See Appendix X) and an attached copy of the instrument (See Appendix XI).

Collection of Data

The standard procedure was that most participating universities received photocopied questionnaires together with a stamped addressed return "Post Pack." This resulted in cost-effectiveness for each participating institution and provided for the convenience of the respondents. However a few universities photocopied the survey from the e-mail. They distributed the blank questionnaires and later collected and posted back the responses. One university permitted the study, but requested that the researcher should distribute the questionnaire at the conclusion of classes. This required a stamped self-addressed envelope to be distributed with each questionnaire.

Analysis of Data

The questionnaire was constructed so that the data generated could be analysed using the SPSS statistical package.

This analysis included the use of cross tabulations on frequencies for creating a demographic profile of participants, a factor analysis of the attitudinal items, and correlations. Any relationship arising from correlations could be further examined using analysis of variance. Finally, multiple linear regression was used to analyse the causal model and test it against the data.

Principal component factor analysis was used to generate an Eigen Value-Factor Plot (also known as 'Scree Plot') to determine the number of factors arising from the analysis (Cattell, 1966; Norusis, 1990). This graph indicates

the total variance per factor, and a 'jump' in variance per factor indicates the number of factors to be extracted. This was followed by a further factor analysis employing varimax rotation. The aim of varimax rotation is to produce independent scales. For this reason items that loaded on two or more scales with a loading difference of less than 0.2 were omitted. In order to strengthen common variance of the items loading on a single factor, items that had a loading of less than 0.2 were also omitted. Items were removed one at a time, and at each step the reliability of any scales produced was examined.

The factors were turned into attitudinal scales by averaging all item scores across the factor for each respondent, ensuring that (providing data was not missing) each respondent received a measure on each attitudinal scale. This meant that the scale scores for each respondent corresponded to a point on a 1 to 4 scale and could be compared to the Likert range of the items.

The Use of Path Analysis

Path analysis is the process by which multiple linear regression is employed to weight the dependencies of a causal model (Asher, 1976). The first step of Path Analysis required the entry of the exogenous and endogenous variables as independent variables in a backward stepwise regression process, with the "Desire to Teach" as the dependent variable (Pedhazur, 1982). The backward stepwise process removes variables that fail at the 0.05 level of

significance. These variables are successively removed from the analysis until the remaining variables meet the test of significance.

The next step of the path analysis required each of the mediating variables to be successively and independently entered into the regression process as dependent variables, with the exogenous background variables as the independent variables. Again, the regression process employed was the backward stepwise method.

The Beta coefficients were then used as the path coefficients of the causal model. The Beta coefficients are those obtained when all variables are entered as z-scores. The significance of the Beta coefficient results from the disappearance of the constant term in the regression equation. For example, consider the following equation:

$$\text{Dependent Variable} = \beta_1 X + \beta_2 Y$$

If variable X is maintained at its mean position, the z-score for variable X is zero. Hence a one standard deviation change in variable Y will produce β_2 of a standard deviation change in the dependent variable. Therefore the β coefficients represent the comparative influences of the variables X and Y on the dependent variable. As a result, the regression equations allow the various strengths of influence of those variables that survive the backward stepwise process to be compared.

Chapter Summary

This chapter outlined important steps that were necessary to gather and analyse data in a manner that would facilitate the construction of a causal model. It explained, how the causal model was to be constructed through using a regression process employing the backward stepwise method, and it showed the weighting that mediating and background variables would have on the ultimate dependent variable. Also, in relation to the preliminary phase of the data collection process, the researcher described the population sample for the study, justified the validity of the questionnaire, and outlined the ethical procedures and protocols for implementing the study.

The next chapter deals with the analysis of data gathered from respondents. The findings of the study will be reported and discussed.

CHAPTER 4

FINDINGS OF THE STUDY

Introduction

This chapter presents the findings of the data analysis. First it scrutinises the "return rates" from students of the eight participating universities and then describes the participants in terms of a range of demographic factors. Next, the chapter presents the results of the factor analysis and examines the inter-relationships arising from the correlation tables. Finally the chapter presents the causal model and the corresponding results of the regressional analysis, followed by a discussion of the findings.

Participating Universities

Coding

The universities that participated in this study were coded using a letter of the alphabet to identify them. They were located across Australia, and offer students a wide variety of courses. To provide a 'context' for the study additional general background information is given about each participating institution in Appendix VI.

Return Rates

Using various means, a total of 824 questionnaires was distributed among eight universities throughout Australia. Of the questionnaires sent out, 365 were completed and returned to the researcher, which represented an

Table 4.1

Questionnaire Return Rate for Individual Universities

Universities	Distributed	Returned	%
A	14	12	85
B	10	8	80
C	85	5	6
D	125	68	54
E	200	103	51
F	80	29	36
G	90	42	47
H	220	102	46
Total	824	365	44

acceptable (but not high) return rate of 44%. Table 4.1 provides a break down of the returns from each university.

Demographic Profile of Participants

University/Gender

Table 4.2 provides the number of respondents according to university and gender. There were 365 respondents from eight universities who participated in this study. The data indicate that one student in two attended University E or H, and that three in every five respondents were male. Further analysis indicate that at five universities there was approximate parity between the numbers of males and females responding to the questionnaire, however in three of the universities, the population of males enrolled in technology teacher education programs significantly out numbered their female counterparts (See Table 4.2).

Table 4.2

Number of Respondents

According to University and Gender

University	Male	Female	Total
A	6	5	11
B	5	3	8
C	2	3	5
D	62	3	65
E	91	6	97
F	14	15	29
G	35	9	44
H	45	56	101
Total	260	100	360

* Five respondents did not indicate their gender.

Age/Gender; Age/Urban/Rural Origin

The ages of the respondents ranged from 17 years to 53 years. In order to simplify the descriptors, participants were categorised in seven age-bands (See Table 4.3). The data indicate that 57% of all female respondents were under the age of 20, whereas only 32% of all male respondents were less than 20 years old. This would suggest that more than half of female respondents were inclined to transit into technology teacher courses very soon after completing secondary school since the age of most students finishing HSC is approximately 18 years. Many male respondents appeared to enter technology teacher education programs later in life.

Table 4.3

Age Groups of Respondents

According to Gender

AGE GROUP YEARS	GENDER	
	MALE	FEMALE
< 20		
Count	84	56
% within gender	(32%)	(57%)
21-25		
Count	56	26
% within gender	(22%)	(27%)
26-30		
Count	24	3
% within gender	(10%)	(3%)
31-35		
Count	40	6
% within gender	(16%)	(6%)
36-40		
Count	24	4
% within gender	(10%)	(4%)
41-45		
Count	15	1
% within gender	(6%)	(1%)
> 45		
Count	10	2
% within gender	(4%)	(2%)
Total		
Count	253	98
% within gender	(100%)	(100%)

* Nine respondents did not indicate their age.

* Five respondents did not indicate their gender.

The data in Figure 4.1 could be viewed as two sub-sets. The first, ranging in age from below 20 years to 30 years, could be considered as those largely settling into a first career. The second sub-set (31 years and older) could represent those making a major career change. The same pattern can be seen in the urban *vis-a-vis* rural origin of respondents (See Figure 4.2).

Figure 4.1

Gender of Respondents According to Age

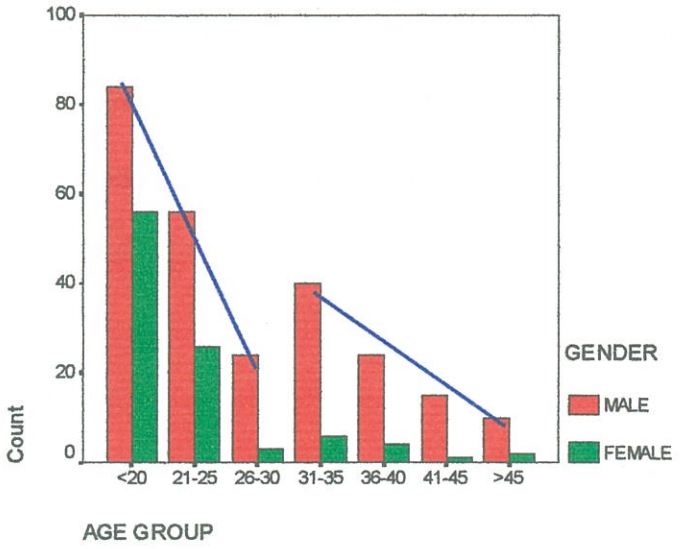
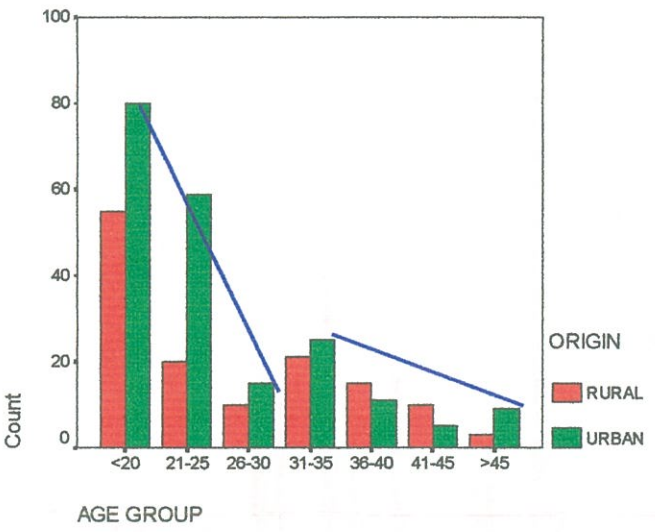


Figure 4.2

Urban/Rural Origin of Respondents According to Age



Age/University

Figure 4.3 suggests that the universities might be catering for differing clientele. For example the respondents in three universities (E, F and H) were predominantly younger students. However, one university (G) had comparatively few respondents younger than 20 years. In contrast, their technology students consisted of a fairly even distribution of respondents ranging in age from 21 years to older than 45 years.

Urban/Rural Origin/Gender

When asked if they considered themselves to be from the city or country, 29% of all female respondents and 44% of all male respondents indicated they were from rural areas (Figure 4.4). The male data do not appear to be

Figure 4.3

Age Groups of Respondents According to University

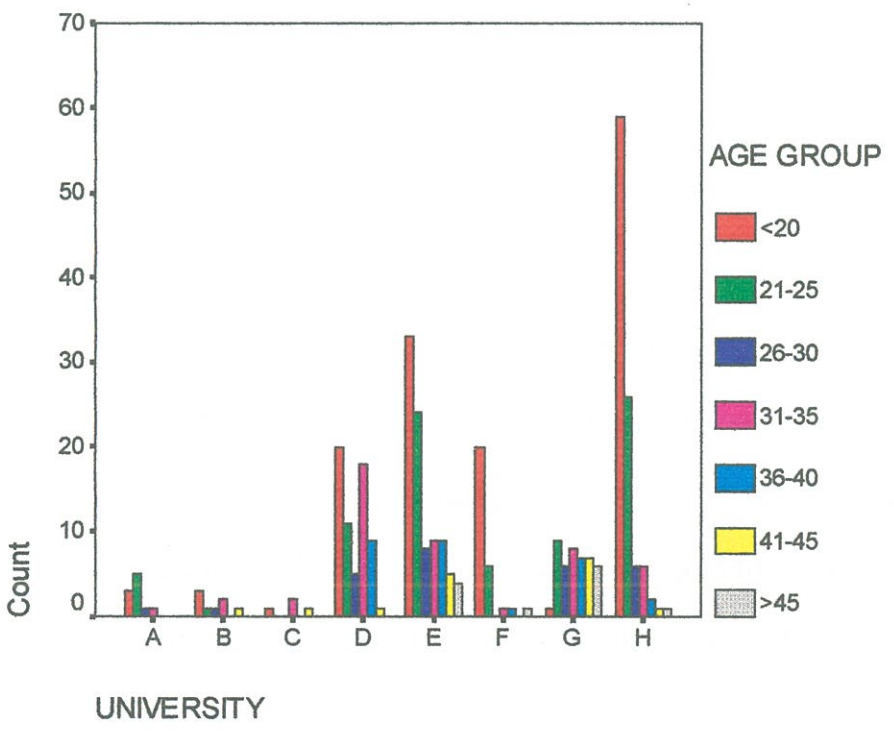
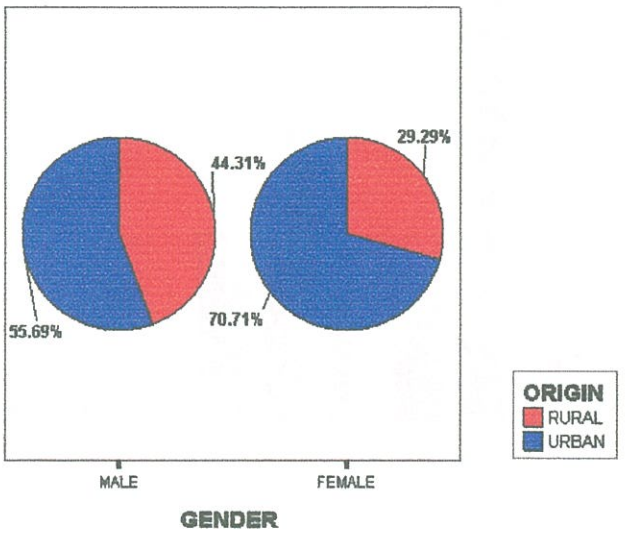


Figure 4.4

Urban/Rural Origin of Respondents According to Gender



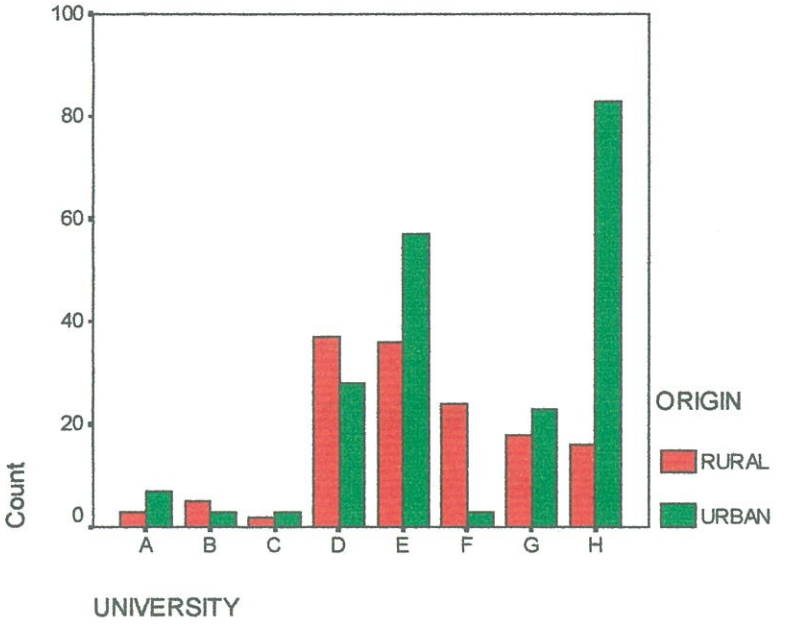
representative of the Australian male population as a whole, because 70% of Australia's population is living in urban centres with a population of more than 70,000 inhabitants (ABS, 2000). It is therefore assumed that there is a moderately greater likelihood of males from rural areas becoming technology teachers, in comparison to their city counterparts.

Urban/Rural Origin/University

All universities had a mix of country and city undergraduates. However, Figure 4.5 illustrates that a large proportion of the respondents from University F, were from the country. Whereas University H had a high percentage of city respondents. Because University F is located in a rural region of Australia, it would be expected to have a high number of country

Figure 4.5

Urban/Rural Origin of Respondents According to University



students. On the other hand, University H is situated in one of Australia's major cities and would therefore attract a large proportion of students from within the surrounding city. In other words the student 'origin mix' appears to reflect the geographical location of the institution.

Study of Secondary School Technology Subjects/Gender

The questionnaire asked respondents to indicate the year levels that they studied technology subjects during secondary school. Figure 4.6 shows that the vast majority of respondents, both male (89.4%) and female (91.8%), were involved in technology subjects at various stages throughout secondary school. The data indicate that a larger percentage of males (32.5%) than females (17.3%) had been involved in technology subjects in junior

secondary school only. However, for *throughout* secondary school, the picture changes, with 63.3% of female and 44.3% of male respondents participating in technology subjects.

Secondary School Exit Levels/Age

The data in Table 4.4 reflect the trend where, increasingly, younger students are completing Year 12 (ABS. 1997, 2000). There is also the suggestion that respondents from older age groups may have left school prior to the completion of their Higher School Certificate (HSC) course.

Figure 4.6

Respondents' Study of

Secondary School Technology Subjects

According to Gender

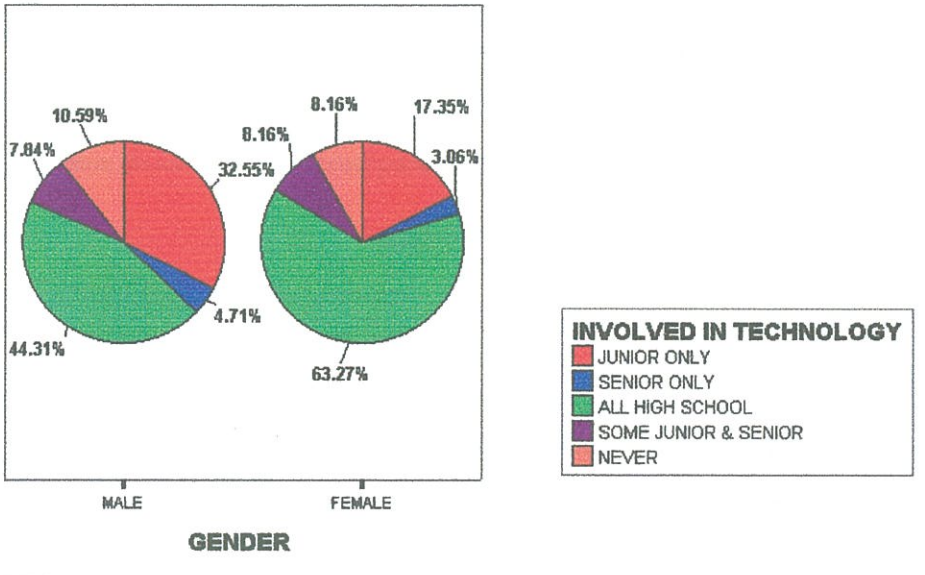


Table 4.4

Secondary School Exit Levels of Respondents

According to Age

AGE GROUP YEARS	SCHOOL EXIT			TOTAL
	EXITED AT YEAR 10 OR EARLIER	EXITED AT YEAR 11	COMPLETED HSC	
< 20				
Count	0	1	139	140
(% within school exit)	(0%)	(1%)	(99%)	(100%)
21-25				
Count	3	6	73	82
(% within school exit)	(4%)	(7%)	(89%)	(100%)
26-30				
Count	9	4	14	27
(% within school exit)	(33%)	(15%)	(52%)	(100%)
31-35				
Count	9	4	33	46
(% within school exit)	(20%)	(9%)	(71%)	(100%)
36-4O				
Count	11	1	16	28
(% within school exit)	(39%)	(4%)	(57%)	(100%)
41-45				
Count	9	1	5	15
(% within school exit)	(60%)	(7%)	(33%)	(100%)
>45				
Count	7	0	4	11
(% within school exit)	(64%)	(0%)	(36%)	(100%)
Total				
Count	48	17	284	349
(% within school exit)	(14%)	(5%)	(81%)	(100%)

* 9 respondents did not indicate their age.

* 7 respondents did not indicate the highest grade completed.

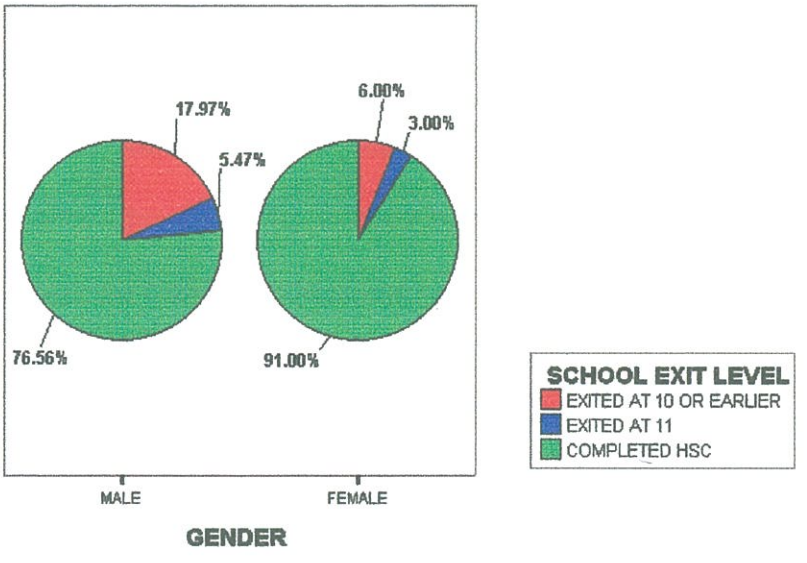
Secondary School Exit Levels/Gender

Figure 4.7 shows that 91% of female respondents completed Year 12 compared to just over 76% of the male respondents. Of the respondents who exited secondary school at Year 10 or earlier, 18% were male with only 6% being female.

Figure 4.7

Secondary School Exit Levels of Respondents

According to Gender



Pursuits Prior to Enrolling in TTEP/Secondary School Exit Levels

Table 4.5 reveals that respondents who did not complete Year 12, came to enrol in technology teacher education programs (TTEP) from either a TAFE or work background. A closer analysis shows that of those exiting secondary school at Year 10 or before, 96% came from work, and of those exiting after Year 11, 88% came from work. It was seen that of the respondents who completed Year 12, 45% came directly from secondary school while 41% had full time work experience prior to enrolling in a TTEP.

Trade Background of Respondents

Some respondents indicated that they had completed trade qualifications prior to their current enrolment. However. from Figure 4.8 it is clear that the majority of respondents (72%) had no trade qualification.

Trade Background/Secondary School Exit Levels

The data in Table 4.6 indicate that only 18% of respondents who had completed their HSC had also completed trade qualifications. In comparison, 69% of respondents who exited secondary school at Year 10 or earlier, had continued on to acquire trade qualifications.

Table 4.5

Pursuits of Respondents

Prior to Enrolling in Technology Teacher Education Programs

According to Secondary School Exit Levels

SCHOOL EXIT	PURSUITS PRIOR TO ENROLMENT					TOTAL
	SECONDARY	TAFE	UNIVERSITY	WORK	OTHER	
EXITED AT YEAR 10 OR EARLIER	0	2	0	50	0	52
Count	(-)	(4%)	(-)	(96%)	(-)	(100%)
(% within school year exit)						
EXITED AT YEAR 11						
Count	0	2	0	15	0	17
(% within school year exit)	(-)	(12%)	(-)	(88%)	(-)	(100%)
COMPLETED HSC						
Count	127	16	21	115	3	282
(% within school year exit)	(45%)	(6%)	(7%)	(41%)	(1%)	100%)
TOTAL						
Count	127	20	21	180	3	351
(% within school year exit)	(36%)	(6%)	(6%)	(51%)	(1%)	100%)

* 7 respondents did not indicate the highest grade completed.

* 7 respondents did not indicate what they did prior to enrolment.

Figure 4.8

Trade Background of Respondents

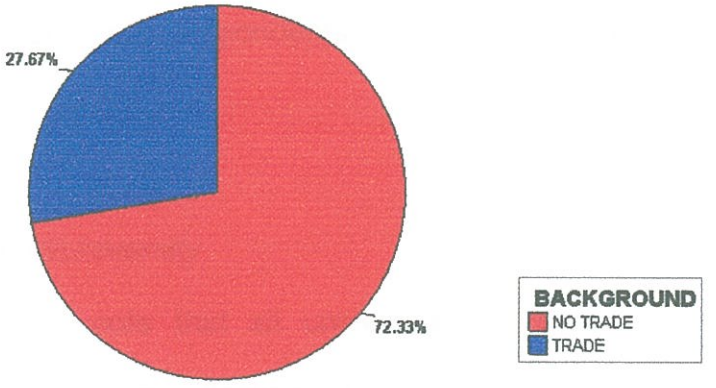


Table 4.6

Trade Background of Respondents

According to Secondary School Exit Levels

SCHOOL EXIT	BACKGROUND		TOTAL
	NO TRADE	TRADE	
EXITED AT 10 OR EARLIER			
Count	16	36	52
% within SCHOOL EXIT	(31%)	(69%)	(100%)
EXITED AT 11			
Count	7	10	17
% within SCHOOL EXIT	(41%)	(59%)	(100%)
COMPLETED HSC			
Count	237	52	289
% within SCHOOL EXIT	(82%)	(18%)	(100%)
TOTAL			
Count	260	98	358
% within SCHOOL EXIT	(73%)	(27%)	(100%)

*** 7 respondents did not indicate the highest grade completed.**

Trade Background/Gender

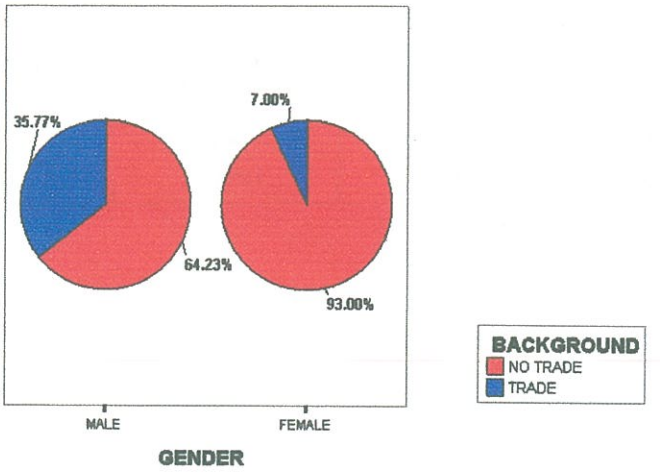
Trade background was examined according to gender (See Figure 4.9), with the data showing that only a very small percentage (7%) of female respondents had a trade qualification prior to enrolment in a TTEP. In contrast, 36% of male respondents held trade qualifications prior to enrolment.

Trade Background/University

It is interesting to note that all universities involved in the study had respondents with trade qualifications (See Table 4.7). University G had the largest percentage (66%) of respondents with trade backgrounds. This appeared logical because this university has designed a specific program to train retrenched BHP workers, of whom there would be a number who had trade qualifications. On the other hand, it would appear that Universities D, F and H had a large majority of respondents *without* trade backgrounds. This

Figure 4.9

Trade Background of Respondents According to Gender



could be explained in that the vast majority of respondents from universities F and H were under the age of 20 years and therefore would not have had time to complete a trade.

Table 4.7

Trade Background of Respondents According to University

UNIVERSITY	BACKGROUND		TOTAL
	NO TRADE	TRADE	
A			
Count	9	2	11
% within UNIVERSITY	(82%)	(18%)	(100%)
B			
Count	4	4	8
% within UNIVERSITY	(50%)	(50%)	(100%)
C			
Count	4	1	5
% within UNIVERSITY	(80%)	(20%)	(100%)
D			
Count	54	14	68
% within UNIVERSITY	(79%)	(21%)	(100%)
E			
Count	60	38	98
% within UNIVERSITY	(61%)	(39%)	(100%)
F			
Count	28	1	29
% within UNIVERSITY	(97%)	(3%)	(100%)
G			
Count	15	29	44
% within UNIVERSITY	(34%)	(66%)	(100%)
H			
Count	90	12	102
% within UNIVERSITY	(88%)	(12%)	(100%)
TOTAL			
Count	264	101	365
% within UNIVERSITY	(72%)	(28%)	(100%)

Interest in Becoming a Technology Teacher/Gender

There were differences between male and female respondents as to when they became interested in becoming a technology teacher (See Figure 4.10). Of the female respondents, 66% became interested during secondary school. This is in line with other data that indicated that 57% of female respondents were under the age of 20 years (See Table 4.3) and were not long out of secondary school. However only 39% of male respondents indicated that they became interested in Technology teaching during their secondary schooling, while 44% were out of school when this interest arose. This is consistent with data that show that 61% of males worked prior to enrolment in a TTEP. (See Table 4.8).

Figure 4.10

Initial Interest of Respondents

in Becoming a Technology Teacher

According to Gender

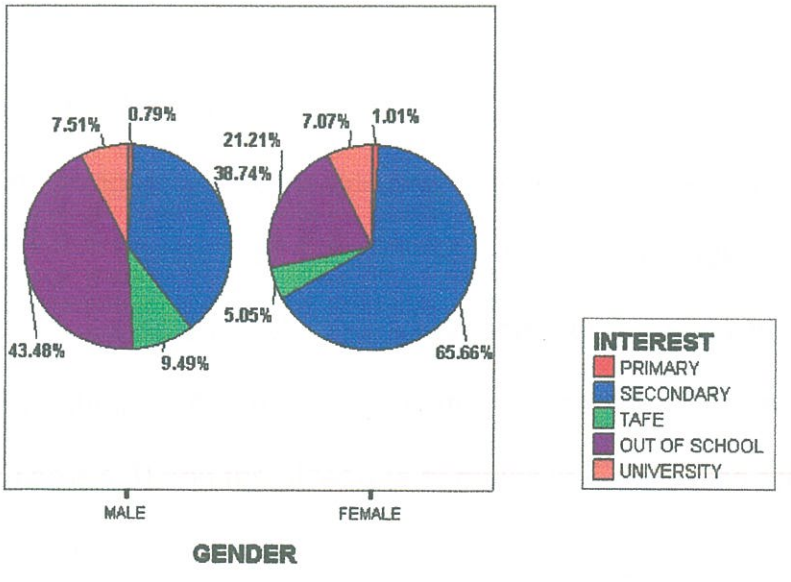


Table 4.8

Pursuits of Respondents

Prior to Enrolling in Technology Teacher Education Programs

According to Gender

GENDER	PURSUIT PRIOR TO ENROLLING					TOTAL
	SECONDARY	TAFE	UNIVERSITY	WORK	OTHER	
MALE						
Count	67	15	16	156	2	256
(% within gender)	(26%)	(6%)	(6%)	(61%)	(1%)	(100%)
FEMALE						
Count	59	5	4	28	1	97
(% within gender)	(61%)	(5%)	(4%)	(29%)	(1%)	(100%)
TOTAL						
Count	126	20	20	184	3	353
(% within gender)	(35%)	(6%)	(6%)	(52%)	(1%)	(100%)

* Five respondents did not indicate their gender.

*Seven respondents did not indicate what their pursuit was prior to enrolment.

Interest in Becoming a Technology Teacher/Urban/Rural Origin

It can be seen in Table 4.9 that there is very little difference between when rural respondents and urban respondents began to be interested in becoming technology teachers. Most respondents either began showing an interest in secondary school or at work.

Pursuits Prior to Enrolling in TTEP/Gender

When comparing male and female respondents' pursuits prior to enrolling in a TTEP, the data indicated (See Table 4.8) that 61% of males came from the workforce, whereas 61% of female respondents transited from secondary school. The number of females who were younger than 20 years on entering a TTEP (Table 4.3) and the older age of males in TTEPs also reflect this.

Table 4.9

Initial Interest of Respondents in Becoming a Technology Teacher

According to Urban/Rural Origin

ORIGIN	INTEREST					TOTAL
	PRIMARY	SECONDARY	TAFE	UNIVERSITY	WORK	
RURAL						
Count	2	70	9	9	49	139
(% within origin)	(1%)	(50%)	(7%)	(7%)	(35%)	(100%)
URBAN						
Count	0	90	18	16	78	202
(% within origin)	(-)	(45%)	(9%)	(8%)	(38%)	(100%)
TOTAL						
Count	2	160	27	25	127	341
(% within origin)	(1%)	(47%)	(8%)	(7%)	(37%)	(100%)

* 17 respondents did not indicate their place of origin.

* 7 respondents did not indicate when they became interested in being a Technology Teacher.

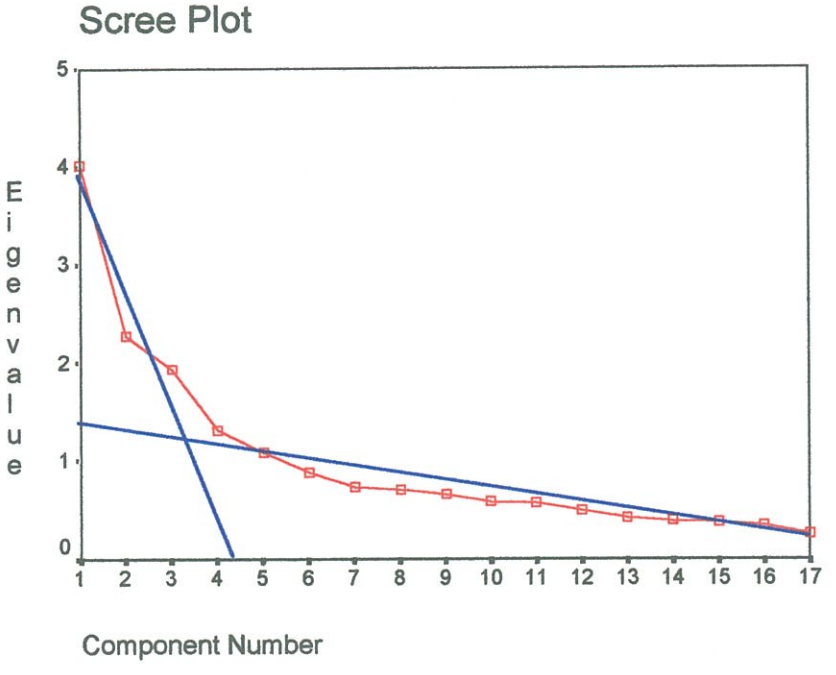
Scale Analysis Formation

Data generated from the 28 attitudinal items in section one of the questionnaire, was initially subjected to a principal components factor analysis with a scree test (Norusis, 1990). The result of the scree test (See Figure 4.11) indicates the presence of three substantial factors. Principal compound factor analysis was repeated with varimax rotation for three factors. These factors were refined by the elimination of items loading at less than 0.2 on the major factor and the elimination of those items that loaded on two or more factors with a loading difference of less than 0.2. Items were removed one at a time. The loading of the remaining items and the scale reliabilities were monitored at each step. Generally the removal of such items strengthened both the residual loadings on the factors and the scale reliabilities. The loading of the items onto factors is indicated in Table 4.10.

Figure 4.11

A Plot of the Eigenvalues

Against Factors Extracted from Questionnaire



Scale scores were generated from the factors by averaging the response weighting across the items of each factor for each respondent. This process meant that every participant was allocated sub-scale scores representing their responses on the three dimensions of influence. The use of the mean item score for each scale allowed the scale score to be compared to the original item Likert scale.

Factors

Factor 1.

This factor was composed of 8 items, related to the influence of community and university personnel in the decision to become a technology teacher. The sub-scale resulting from this factor was labelled "Community Influence"

Table 4.10

Factor Loadings for Questionnaire Items

Item	Factors		
	1	2	3
Community Influence (Alpha = 0.77)			
17. I was encouraged by other community personnel.	0.70		
16. I was encouraged by a community professional.	0.66		
13. I was encouraged by other university personnel.	0.66		
12. I was encouraged by a university technology education lecturer.	0.64		
15. I was encouraged by college/university students.	0.59		
19. I was encouraged by a youth leader.	0.59		
18. I was encouraged by a church leader.	0.57		
14. I was encouraged by other non-university adults.	0.54		0.20
School Influence (Alpha = 0.76)			
6. I was encouraged by a high school technology teacher.		0.80	
4. I admired a high school technology teacher as a role model.		0.77	
10. I was encouraged by parents.	0.23	0.67	
3. I enjoyed secondary school technology course(s).		0.67	
9. I was encouraged by high school classmates.	0.26	0.61	
Desire to Teach (Alpha = 0.74)			
26. I like working with high school students.			0.79
25. I like teaching others special skills.			0.76
27. I enjoy creating/assisting others to create.		0.21	0.70
28. I wanted to be a teacher.			0.68

*Loadings of less than 0.2 were omitted

and was found to have a reliability of 0.77 as measured by Cronbach's Coefficient Alpha (Norusis, 1990). All items incorporated by this factor related to some form of encouragement by people from outside secondary school and the immediate family (See Table 4.10).

Factor 2.

The second factor incorporated 5 items that related to the influence of secondary school on the decision to be a technology teacher. The sub-scale resulting from these items was found to have a reliability of 0.76 and was labelled "School Influence" as items reflected encouragement by high school teachers, enjoyment of technology subjects, admiration of technology teachers as well as encouragement by parents (See Table 4.10).

Factor 3.

The third factor consisted of 4 items that expressed intrinsic motivation to become a teacher. The reliability of this sub-scale was found to be 0.74 and was labelled "Desire to Teach" as the component items reflected an attraction for teaching skills to others, working with high school students and a general desire to be a teacher (See Table 4.10).

Sub-scales

Community Influence

Figure 4.12 shows the median, maximum, minimum, and percentiles for the scale - "Community Influence". While "Community Influence" was a

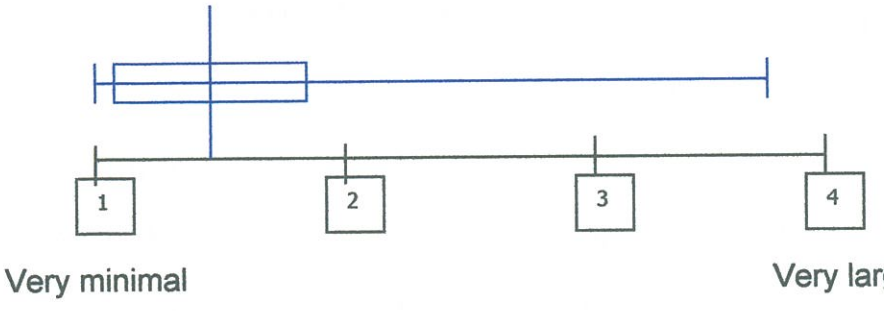
Figure 4.12

Measures of "Community Influences"

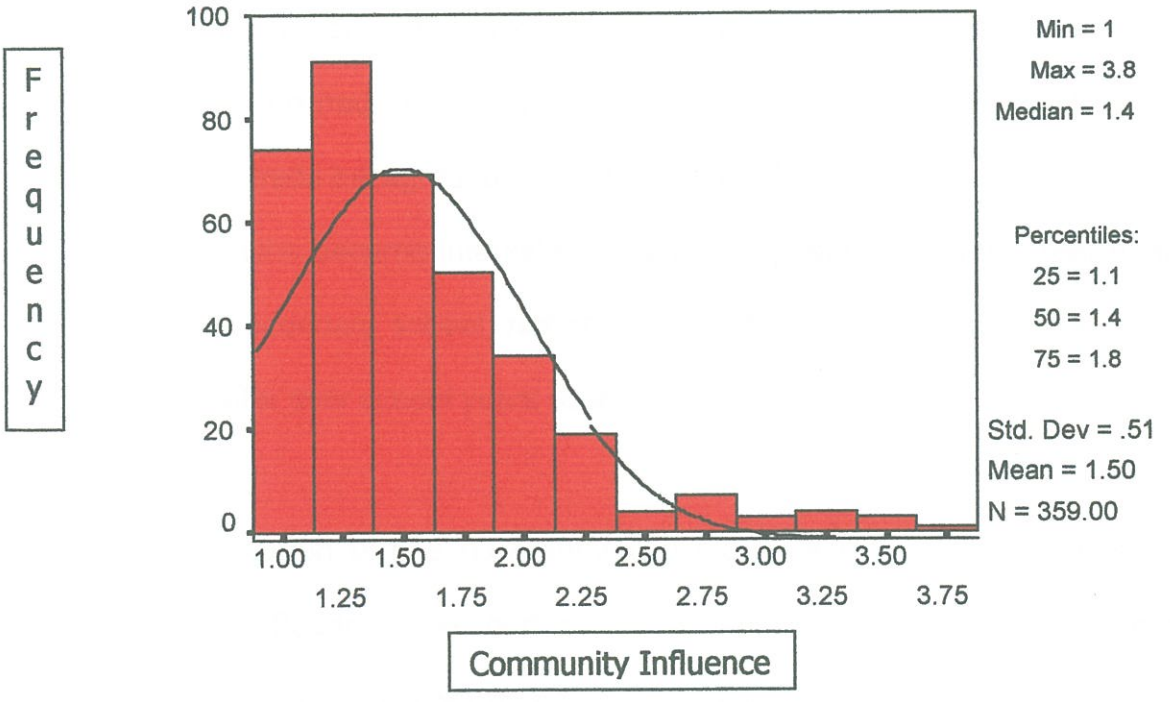
as Perceived by Respondents Enrolled in a TTEP

Both Set Against the Item Likert Scale.

(Box-plot and Histogram)



Very minimal Very large



substantial factor in respondents' decisions to become a technology teacher, never-the-less, it should be noted that 75% of the respondents indicated that they perceived that the community had little influence upon their decision.

School Influence

The box-plot and histogram related to "School Influence" shows that the spread of responses extends across the entire scale (See Figure 4.13). However a more detailed analysis indicated that the mean "School Influence" was significantly greater for:

- younger students than for older students (See Figure 4.14a).
- individuals who came directly from school to a TTEP rather than for those who came from other educational backgrounds (See Figure 4.14b).
- those who had no trade background as compared to those who came from a trade background (See Figure 4.14c).
- those who became interested in technology teaching as a career during their secondary school, rather than for those whose interest developed well after their school years (See Figure 4.14d).

The implication of the data shown in Figure 4.14a, b, c, d is that the potential influence of secondary school technology classes is greater on those just leaving school than on those who have been involved in other pursuits and activities in the years between school and commencing a TTEP. It appears that the immediate social and mental environment has a significant influence on personal, long-term decisions.

Figure 4.13

Measures of "School Influence"

as Perceived by Respondents Enrolled in a TTEP

Both Set Against the Item Likert Scale.

(Box-plot and Histogram)

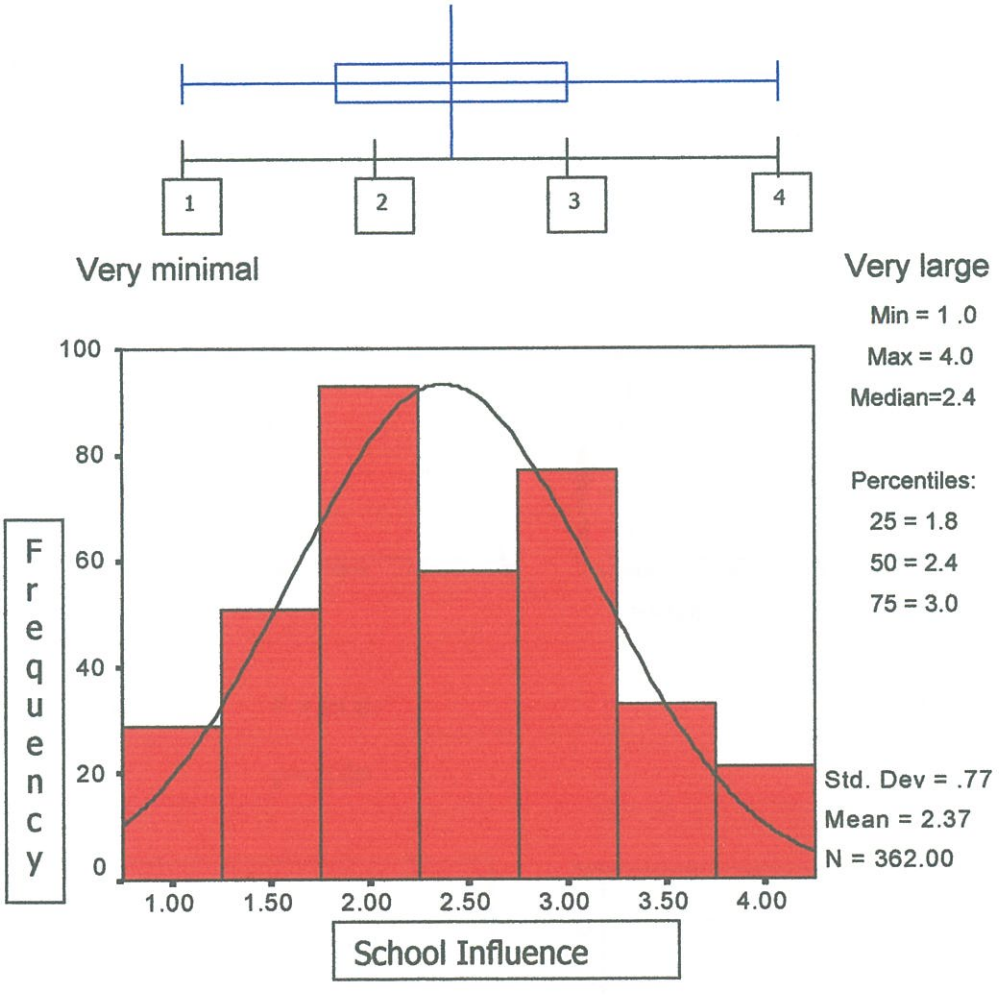


Figure 4.14

The Relationship between "School Influence" and:

(a) age of respondents.

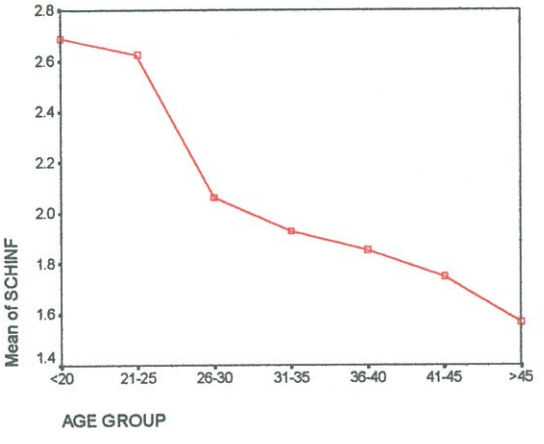
(b) pursuits of respondents prior to enrolling in a TTEP

(c) trade background of respondents.

(d) initial interest of respondents in becoming a technology teacher.

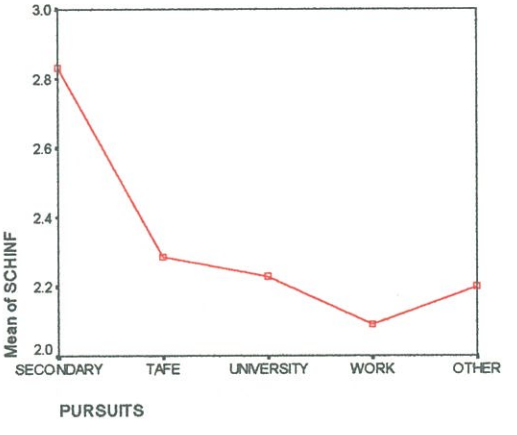
(a) $F = 34.8$

$p < 0.05$



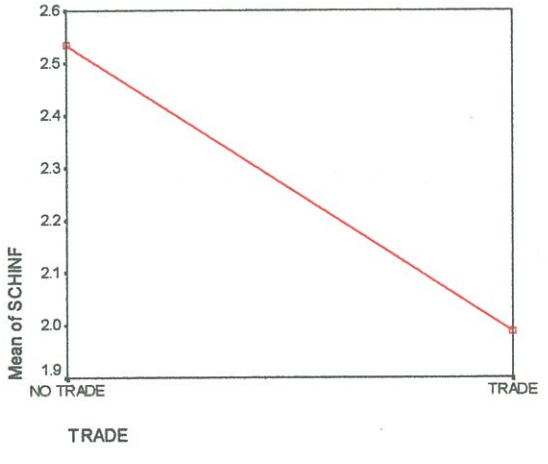
(b) $F = 21.6$

$p < 0.05$



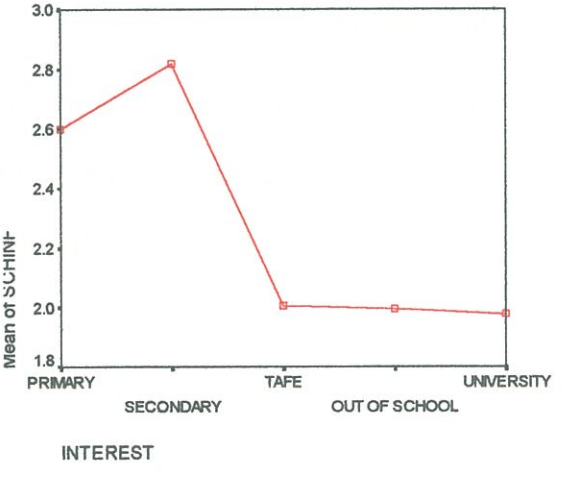
(c) $F = 21.6$

$p < 0.05$



(d) $F = 39.4$

$p < 0.05$



The same analysis was carried out on the third factor relating to the respondents' "Desire to Teach" (See Figure 4.15). The results indicated that the majority of respondents reported that the desire to teach was a positive influence on their decision to enrol in a TTEP. The results also indicated a median score of 3.3 on a 4 point Likert scale. The desire to teach appears to be a driving force for entry into technology teacher education programs.

Correlations

Table 4.11 is a correlation table that shows only those correlations that exceed a magnitude of 0.2. This represents 4% common variance and therefore any correlation with a magnitude less than 0.2 does not provide any meaningful information. The variables entered into the correlation process included the influence scales, some individual items excluded from the influence scales by the factoring process, plus a range of background variables such as gender, age, and the nature of parental employment.

The correlations provide evidence of the cohesiveness of the results. They 'hang together' and are consistent with casual expectations. For example, there is a consistent perception of encouragement from school personnel. Those who felt that they were encouraged toward technology teaching by their principal also felt that they were encouraged by the guidance counsellor (r=0.29) and by non-technology teachers (r=0.28).

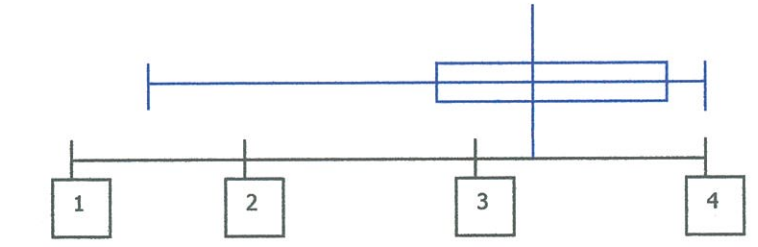
Figure 4.15

Measures of "Desire to Teach"

as Perceived by Respondents Enrolled in a TTEP

Both Set Against the Item Likert scale.

(Box-plot and Histogram)



Very minimal Very large

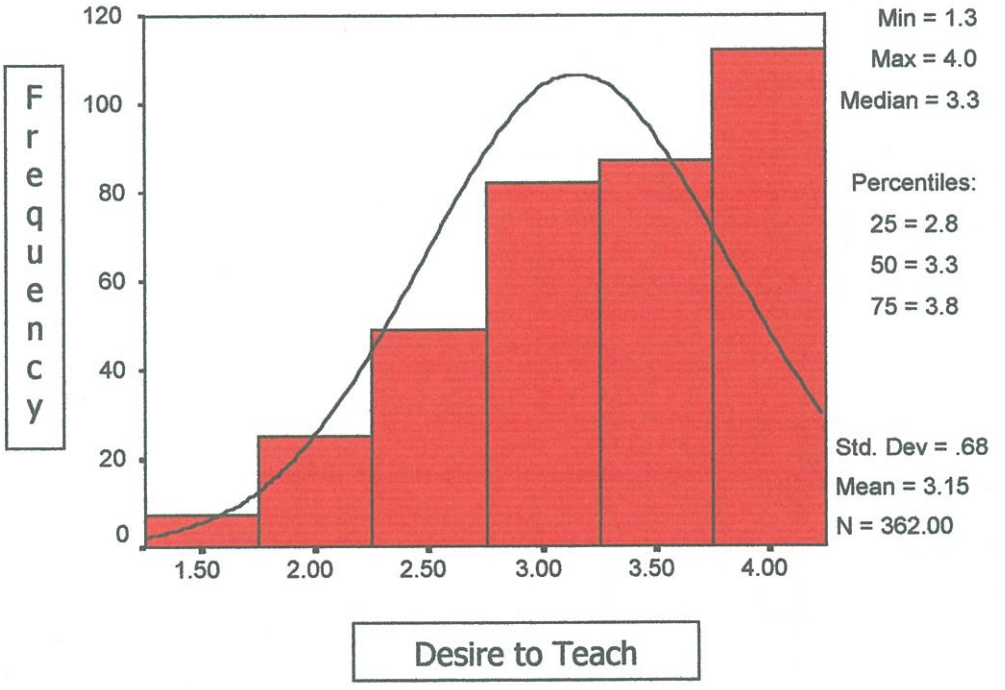


Table 4.11

Correlation Table showing Correlations greater than (R) = 0.2

	i)	ii)	iii)	iv)	v)	vi)	vii)	viii)	ix)	x)	xi)	xii)	xiii)	xiv)	xv)	xvi)	xvii)	xviii)	xix)	xx)	xxi)	xxii)
i) Interests/hobbies before enrolment																						
ii) Interests/hobbies after enrolment	0.30																					
iii) Encouraged by high school principal			0.29																			
iv) Encouraged by guidance counsellor			0.28	0.32																		
v) Encouraged by teacher (other)																						
vi) Encouraged by other relatives																						
vii) Previous teaching experience																						
viii) Encouraged by business/industry personnel								0.37														
ix) Retraining for job security									0.35													
x) Increased likelihood of employment																						
xi) TV add about tech teaching																						
xii) Employment of mother																						
xiii) Employment of father																						
xiv) GENDER												0.33										
xv) AGE							-0.20		-0.20													
xvi) EXIT									0.53			-0.34	-0.21	-0.25								
xvii) INTEREST									-0.40						-0.54							
xviii) PRENROL					-0.22				0.34					-0.21	0.54	-0.30						
xix) TRADE			-0.23	-0.21				0.24	0.50			-0.23		-0.32	0.63	-0.38	0.62					
xx) DESIRE	0.27							0.22	0.52					0.30	0.49	-0.42	0.37	0.55				
xxi) SCHINF	0.24		0.32	0.26	0.43	0.35			-0.27					0.24	-0.49	0.25	-0.50	-0.43	-0.32	0.20		
xxii) COMMUINF			0.27	0.22	0.33	0.37		0.31	0.20		0.20									0.24	0.25	

Similarly, those who felt that they were encouraged by other teachers on the staff to enter technology teacher education programs, also felt that they were encouraged by the guidance counsellor (r=0.32).

In the entry of data, gender was indicated with males being coded as "1", and females as being "2". With this in mind, there was a significant relationship between age and gender (r=-0.25), suggesting that older respondents tended to be male. It also appeared that older respondents were influenced to a greater degree by the need to retrain for job security (r=0.53). The table indicates that, in contrast to their older counterparts, younger respondents tended to have parents in professional or semi-professional employment (r= -0.34; r= -0.21). This would also be consistent with anecdotal evidence suggesting that over the past three decades there has been an increase in the proportion of those employed in technical or professional areas.

In addition, older students were more likely to have left school prior to completing the ultimate year of secondary schooling (r= -0.54). In contrast to older respondents, younger respondents were more likely to have completed their HSC (r= -0.54). Unlike older respondents who had not been at school for 'some years,' younger respondents tended to indicate an encouragement to enter technology teacher education, stemming from school influences (r= -0.49).

There was a tendency for those respondents who had obtained trade qualifications prior to enrolling in technology teacher education programs to feel that they were encouraged into technology teaching by business or industry personnel (r=0.22). Further, those respondents "with trades" were more likely to have exited secondary school earlier than those "without trades" (r=-0.42), and therefore it would also stand to reason that those "with trades" were also involved in full-time work prior to enrolling into a TTEP (r=0.55).

These cohesive patterns within the correlation table add validity to the data arising from the questionnaire.

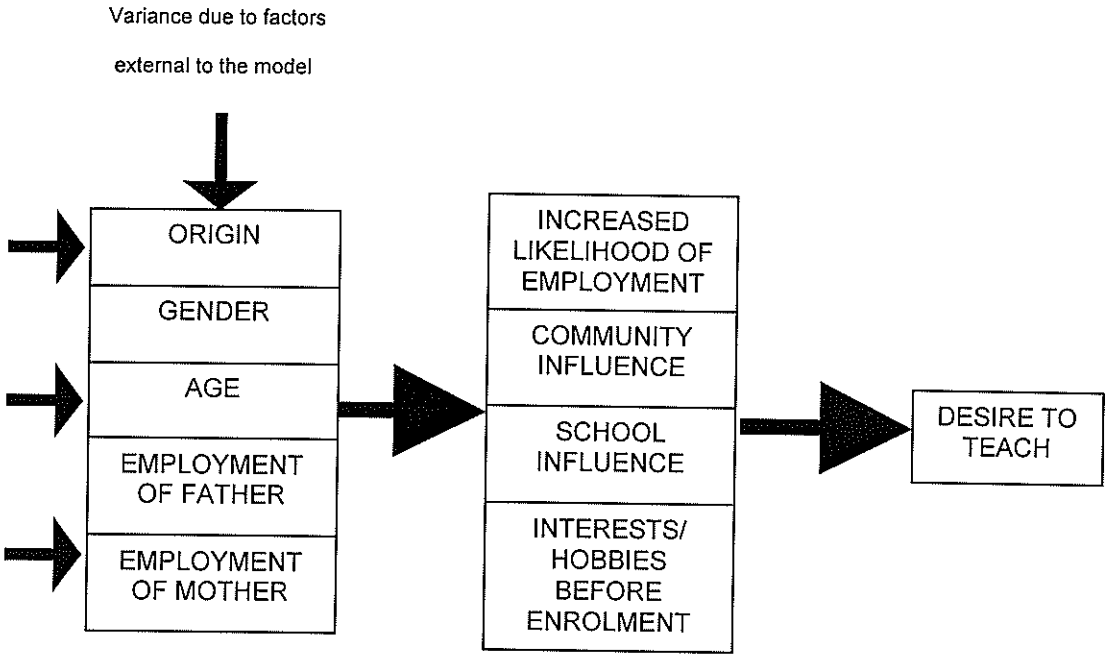
Analysis of the Exploratory Causal Model

The model that was developed is represented by Figure 4.16. The exogenous background variables included "Origin", "Gender", Age", "Employment of Father", and "Employment of Mother." The endogenous variables consisted of "Likelihood of employment", "School Influence", "Community Influence", and "Interests/Hobbies before enrolment". The ultimate dependent variable was the "Desire to Teach".

As already stated, a backward stepwise multiple linear regression analysis was employed to test the model. The results of this process are given in Table 4.12.

Figure 4.16

Typical Three Stage Causal Model



Relationships between the "Desire to Teach" and exogenous background variables and the endogenous mediating variables were translated into the path diagram shown in Figure 4.17. Fifteen percent of the variance of "Desire to Teach" was explained by such factors as "School Influence", "Community Influence", Age and Origin. Because standardised regression equations have no constant term, the cumulative effect of each variable upon the ultimate dependent variable of the model could be simply calculated (See Table 4.13).

The relationship between "School Influence" and its component variables is such that variations in component variables account for 25% of variance in

Table 4.12

Dependent Variable and Coefficients

Arising Out Of the Repeated Use of Standardised Regression Equations

Using the Independent Variables:

"Desire To Teach", "School Influence", "Community Influence", and

"Interests/Hobbies Prior to Enrolment."

Dependent Variable	Independent Variable	Beta	1.645 x Standardised Error	R^2
"Desire to Teach"	School Influence	0.17	0.11	0.15
	Community Influence	0.17	0.10	
	Age	0.18	0.12	
	Interests, hobbies before enrolment	0.27	0.10	
"School Influence"	Origin	-0.10	0.08	0.25
	Age	-0.47	0.09	
	Gender	0.13	0.08	
"Community Influence"	(-)	(-)	(-)	(-)
"Interests, hobbies before enrolment"	Gender	0.11	0.09	0.04
	Employment of Father	0.18	0.09	

"School Influence". This means that 75% of variance of "School Influence" is explained by factors external to the model. The regression equation for "Interests and hobbies before enrolment" is somewhat weaker in that the exogenous variables explain only 4% of variance of the dependent variable, leaving 96% of variance to be explained by factors external to the model. For the dependent variable "Community Influence" the regression equation suggested that all of the variance of the dependent variable was explained by factors outside the model.

Figure 4.17

The Measure of the Variables' Contributions

to Respondents' "Desire to Teach."

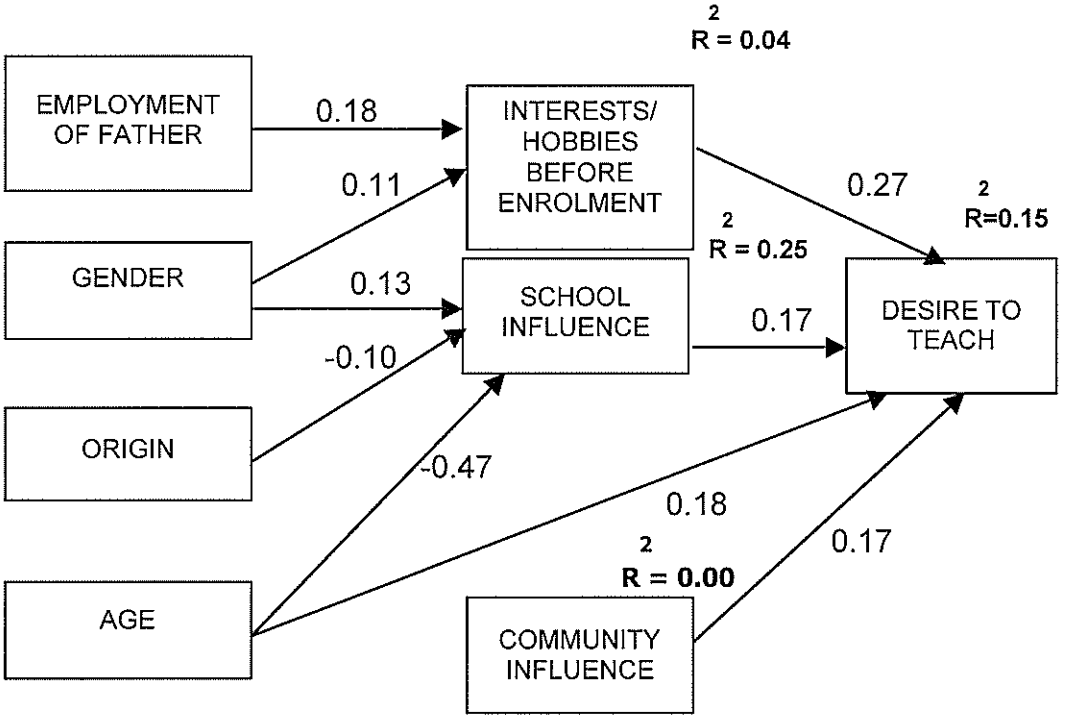


Table 4.13

Cumulative Effect of the Various Background Variables

upon the Ultimate Dependent Variable:

"Desire to Teach"

"Desire to Teach		
Variables	Calculations	Total
Interests, hobbies before enrolment	0.27	+0.27
School Influence	0.17	+0.17
Community Influence	0.17	+0.17
Age	(-0.47 x 0.17) + 0.18	+0.10
Gender	(0.11 x 0.27) + (0.13 x 0.17)	+0.05
Employment of Father	(0.18 x 0.27)	+0.05
Origin	-0.10 x 0.17	-0.02

General Implications of the Model

The model represented all of those factors which survived the regression process, that have an influence on "Desire to Teach."

Of the mediating variables, "Interests and hobbies before enrolment" with a path coefficient of 0.27 became the strongest predictor of a desire to become a technology teacher. "School Influence" (path coefficient 0.17) and "Community Influence" (path coefficient 0.17) had roughly equal but a lesser impact on "Desire to Teach" than did "Interest and hobbies before enrolment". However each moderating variable played differing roles as they mediated in the influence of the background variables. For example, those who indicated an interest in hobbies tended to be female (path coefficient 0.11) and had fathers who have a technical or professional mode of employment (path coefficient 0.18).

Those who indicated an influence emanating from secondary school also tended to be younger (path coefficient -0.47), female (path coefficient 0.13), and from urban areas (path coefficient –0.10).

The influence of the community was interesting. No background variables were linked to "Community Influence". Moreover, almost all respondents indicated that the community played a very minimal role in their decision. Yet the path linkage (0.17) shows that even though all indicated low "Community

Influence" the subtle differences in the scores were positively linked to changes in the "Desire to Teach".

Age also played an interesting role. Older respondents indicated a stronger "Desire to Teach" (path coefficient 0.18); at the same time older respondents indicated a low level of "School Influence" (path coefficient –0.47).

Table 4.13 provides a view of the cumulative effect of various independent variables ranked in order of their path strengths. According to this table the strongest predictor of the "Desire to Teach" is "Interests and hobbies before enrolment" (0.27). The next two major influences being "School Influence" and "Community Influence" which have equal path strengths (0.17). The remaining variable's effect on the "Desire to Teach" was mediated by the endogenous variables.

The background variable "Origin" was coded with urban origin being "1" and rural origin "2". This indicates that the mediated effect that "Origin" has on the "Desire to Teach" has a cumulative path coefficient of –0.02. This suggests that the urban origin of respondents through the mediating variable of "School Influence" has minimal influence on the "Desire to Teach."

Discussion of Findings

The notable study by Wright and Custer (1998) found that "Personal interests or hobbies" was cited most frequently as an influential factor by respondents,

in their decision to become a technology teacher. The causal model of the present study suggests a similar trend among Australian undergraduates, with "interests and hobbies before enrolment" being the most influential element of the explained variance of the factor "Desire to Teach." It also suggested that "School Influences" included such factors as the positive traits of technology teachers in secondary school, the additional encouragement from parents and high school peers.

Although a causal model was not presented in the Wright and Custer (1998) study, it did indicate that student encouragement by Industrial Arts teachers/Technology Education teachers, and the positive aspects of the subject discipline were among the most frequently cited positive influences. In the present study, however, these factors were all included in "School Influences" and rated below "Interests and hobbies" and at the same level of importance as "Community Influences."

Within the Wright and Custer (1998) study the effect of community was unclear. Only 2% of their respondents cited community personnel as important. However these 2% rated it highly. In a similar way, the role of "Community Influence" was confusing in the present study. Almost 75% rated it as a minimal influence on their desire to become a teacher, yet the variable survived the backward regression process and was linked to "Desire to Teach." Thus, there was a general consensus among undergraduates that "Community Influence" had no real impact on their decision to become

technology teachers. However those who registered on the lower end of "Community Influence" also registered on the lower end of "Desire to Teach". In contrast, those who 'signalled' slightly higher scores on "Community Influence" also had a tendency to register on the higher end of "Desire to Teach".

Although age of undergraduates was not discussed in the Wright and Custer (1998) research, the desire of Australian undergraduates to teach correlated with age. The model suggests that the older undergraduates tended to exhibit a stronger desire to become a technology teacher. This may be related to a need for older Australians to move into an occupational area where they will have less chance of being made redundant. Another possible reason may be that older persons are more confident in their own abilities to relate to other people. They may feel that they have the ability to teach in a classroom situation and see it as a means of passing knowledge to the next generation.

The data indicated a positive link between fathers' employment and the development of interests and hobbies. A reason for this could be that as the occupation of the father becomes more professional, the technological knowledge and the amount of disposable income increases and thus allows a greater experimentation with hobbies. It is interesting also that females appear to show an inclination toward hobbies. Males may spend more time in sport or pursuits other than technical hobbies.

The factors that grouped together to form the "School Influence" scale revolved predominantly around the technology teacher and the classroom. Students, who indicated a high desire to teach, also tended to feel a high level of encouragement from their technology teacher; admired that teacher as a role model, and enjoyed technology subjects. These are matters over which the technology teacher *can* have control.

It would be expected that if secondary school technology teachers adapted their programs to provide an avenue for students to pursue their interests and hobbies, students would feel positive about the technology subjects. In order to maintain a keen interest in the students, out of class time may need to be made available for work on projects. This has the potential to 'condition' the students to associate satisfaction and enjoyment with technology subjects at school.

A teacher who is not passionate about their subject and is seen as unapproachable will tend to set a class tone that relays a negative message about technology as a secondary school subject. Therefore students would be influenced positively toward technology teaching if it was obvious that their technology teachers enjoyed teaching, and also if they encouraged students to consider technology teaching as a rewarding career option.

Parents could also be instrumental in encouraging their children to consider technology teaching. At parent/teacher meetings and "career nights,"

technology teachers could promote technology teaching as a rewarding occupation, with information concerning technology teacher education programs being made available for parents to take home and discuss with their children. These would be additional avenues to positively influence, guide and direct students.

Clearly, females appeared to respond more strongly to school influences than did males. It may be that giving more attention to males and their interests could create greater engagement in technology classes and hence encourage in males a desire to teach.

The data indicated that older individuals were less likely to be influenced by school than younger ones. This would be expected, however it was also seen that older persons had a greater desire to become a technology teacher. Marketing strategies should be employed that appeal to all ages, emphasising the need for teachers of excellence and highlighting the positive and exciting challenges aspects of being a technology teacher.

It was also seen that the urban origin of respondents influences "Desire to Teach" mediated by "School Influences. It may be that urban schools have access to a wider range of technology than their rural counterparts, and therefore can cater for a variety of student interests. Thus, if rural schools were given the opportunity to explore a wider variety of technology curriculum

areas than are currently available, this should lead to more rural students enjoying technology subjects choosing to become technology teachers.

Chapter Summary

This chapter dealt with the demographic profile of the respondents who participated in the study. It described the strategy for producing a causal model with the ultimate dependent variable being the "Desire to Teach". The chapter concluded with a discussion of findings.

In the chapter to follow the researcher will review aspects of previous chapters, draw general conclusions, make recommendations and point out limitations of the study.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The culminating chapter of the thesis seeks to bring together salient parts of chapters 1 - 4. The conclusions drawn from the analysis of data 'speak to' the posited research questions and lead to subsequent recommendations. A discussion of limitations at the end of the chapter brings an added measure of objectivity to the research study.

Summary

The wide-spread and growing shortage of teachers generally, and of technology teachers particularly, both overseas and in Australia, presents a situation which invites and needs to be addressed. To 'shed light' on this human resources problem, the present study sought to answer the following research questions:

1. What are the basic demographic characteristics of the technology teacher education undergraduate population in Australia?
2. What factors influence individuals to select, and enrol in technology teacher education programs?

A review of the literature identified notable Australian studies which reported a slight overall increase of enrolments in TTEPs at universities (for the period 1993-1999), despite the closure of some programs.

Little information was gained from the literature in relation to the research questions with the exception of an American study which found that respondents cited "Personal interest and hobbies" as the most *frequent* influential factor in their decision to become a technology teacher, while the most *influential* factors were encouragement from a technology teacher, and also from community personnel.

A causal model was explored as part of the literature search and which later was incorporated into the study's research design and methodology. That consisted of the following parts:

- construction and then distribution (and collection) of the questionnaire instrument to/from eight universities with a total enrolment of 833 undergraduate students in TTEPs,
- the use of cross tabulations on frequencies to create a profile of participating undergraduate technology teacher education students,
- factor analysis of attitudinal items,
- the preparation of correlation tables, and
- the use of path analysis through the employment of multiple linear regression to weight dependencies of the causal model.

Given the nature of the data analysis and findings, and the discussion of findings as reported in chapter 4, it seems both logical and reasonable to reach the following general conclusions:

Conclusions/Recommendations

In relation to research question 1, the conclusion is drawn:

- Technology teacher education undergraduates in Australia represent a diverse, *vis-a-vis* a homogenous group. Some universities have a distinctive clientele enrolment profile characterised by students' ages, geographical origin, and trade background.

The diversified student profile would indirectly reflect student needs and thus has implications for faculties of teacher education at tertiary institutions in the areas of program and curriculum offerings, teaching and learning strategies, as well as assessment and evaluation procedures.

It is recommended/suggested that faculties of education at each tertiary institution respond creatively and effectively to the specific learning needs of its technology teacher education clientele.

Furthermore, in relation to research question 2, the following general conclusion is drawn:

- It is the fostering of hobbies and interests; and the climate, program and personnel of the secondary school that has the potential to influence individuals' decisions to become a technology teacher.

The implications of this conclusion are wide and involve multiple stakeholders - technology teachers, heads of secondary school technology departments, school administrators, career advisers, and students themselves.

It is recommended/suggested that major stakeholders in secondary schools work collaboratively *vis a vis* in isolation, and engage in strategic educational planning. This should lead to the implementation of effective strategies in influencing students' decisions in relation to career choices.

On a different level (because the causal model of the present study highlighted the influence that age has on undergraduates' desire to teach), it is also recommended/suggested that education employers/system and tertiary institutions offering TTEPs identify and target mature individuals in the workplace as potential technology teachers as part of an overall marketing strategy to address the present teacher shortage.

Limitations of the Study

In retrospect, for the purpose of objectivity, it is appropriate to mention aspects of the study which acted as limitations.

Although there is sufficient literature discussing the shortage of technology teachers, there was a scarcity of literature concerning the influences on people to engage in undergraduate technology teacher education programs. This was amplified in the Australian context.

There were some difficulties and problems with the questionnaire. Of the 119 returned questionnaires that had been printed direct from e-mail attachments, 21 responses were missing in connection with attitudinal item number 24. This limited the questionnaire's effectiveness to represent this item. In addition, item number 28 consisted of a double proposition. Co-joined propositions are discouraged because they have the potential to be confusing. "Interests and hobbies" can have two different meanings, and therefore should have been broken up into two separate attitudinal responses to allow for an accurate measure.

Although "trade backgrounds" of respondents was explored, there were no questions relating to the specific trade backgrounds of respondents. This variable was created from the final question in section two of the questionnaire, where a number of respondents indicated that they held trade qualifications and had been working in that field prior to enrolment. Without a separate question relating specifically to obtaining trade qualifications, there was the potential for a greater number of respondents to have "trade" qualifications.

The attitudinal items were worded in a way that was consistently positive. This may have influenced the responses and the reliability of this section of the questionnaire. To overcome this, the questions could have been written in a combination of both positive and negative ways, with the need to recode the negative responses.

Because universities have different schedules, course structures, and practice teaching sessions, these, together with the time restraints on the researcher, limited the number of students who could be surveyed at the time the questionnaires were distributed, and thus effected the response rate. The result was that some universities were poorly represented. A way to avoid this would be to liase with the appropriate contacts so as to select periods when the population group is available.

Technology teaching covers a 'wide' field and technology subjects may differ from state to state. Thus an investigation could look into specific subject areas to probe for links between the desire to teach and particular (technology) subjects.

Finally, the causal model was purely exploratory and a more carefully constructed and argued model might be required in a subsequent study, to verify the findings of this present study.

Recommendations for Further Study

A carefully researched and constructed causal model needs to be developed together with an improved questionnaire to repeat this study across a greater number of respondents. This study could also be implemented in conjunction with a review of recruitment practices among those institutions offering technology teacher education programs.

Concluding Statement

The causal model, although exploratory in nature, reflects to a large degree what the literature said about influences on industrial arts/technology teacher undergraduates in the USA. It is the hope of the researcher that the development and testing of the model has made a small but useful contribution to the technology teacher education knowledge base, and to the clients whom it serves.

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Appendix I.

E-mail from Dr. John Williams

describing technology teacher education in Queensland

From: Dr John Williams pwilliam@earwig.ed.ac.cowan.edu.au
Date: Friday, 15 May 1998 15:12
To: Owen Cowley owen.cowley@avondale.edu.au
Subject: Technology Education at ACU (NSW)

Forwarded Message Follows
Date: Mon, 27 Apr 1998 09:44:56 – 0700
From: Howard Middleton H.Middleton@edn.qu.edu.au
To: p.j.williams@cowan.edu.au
Subject: NTTEC

The situation in Queensland is as follows:

Griffith University is the sole provider of technology teachers for Queensland schools. The 1998 intake was 58. This was the second successive year where both the student intake number increased with a corresponding increase in the score required to enter the course. The cut-off for entry to the Bachelor of Technology Education (BTechEd) for 1998 was higher than for maths and science education and equal to all other secondary specialisations offered at Griffith.

Based on the above details, the situation would appear to be satisfactory. However, we have had to fight for each student place and have been assisted in1998 by lower than expected demand for courses in other faculties within the University, a situation we cannot count on in the future. We are not keeping up with demand for technology teachers even on a replacement basis and given that Queensland is a growing state and one where increasingly non-government schools are introducing technology education programs, the situation is not satisfactory.

Our BTechEd is a relatively new degree with its first five year review close to completion. The degree has an embedded honours option where students can complete honours within the four years of the degree. Honours graduates can go straight to a PhD program. To date 3 honours students have graduated.

A submission for funding to enable a suite of masters level technology education subjects to be developed and offered on the web has been approved. These subjects will become available within the MEd Studies, and will allow teachers to complete a masters degree by flexible delivery, with a substantial component within technology education. For the first time, we will be able to offer technology-orientated study from a doctoral level. The first subjects will be available in semester1, 1999.

Technology staff have been invited to develop and teach the technology key learning area within the new BEd Primary. The new degree will commence in 1999 and technology education will have core study status. We see this as an important contribution to the further development of technology education in Queensland.

I think that's just about all.

Regards,

Howard.

Appendix II.

E-mail from Dr John Williams

describing technology teacher education in Western Australia

From: Dr John Williams pwilliam@earwig.ed.ac.cowan.edu.au
Date: Friday, 7 May 1998 15:30
To: Owen Cowley owen.cowley@avondale.edu.au
Subject: Tech teacher training in WA

NTTEC Colleagues,

Today's description of technology teacher training is for Western Australia, courtesy of myself:

Edith Cowan University is the sole provider of technology teachers in WA. In schools the Technology and Enterprise Learning Area is comprised of home economics, design and technology, computing, agriculture and business studies. ECU supplies teachers who can major in home economics, design and technology and business, and minor in computing.

Curtin University was involved in training design and technology teacher up until 3 years ago when the course was closed. Murdoch proposed to begin a course this year in cooperation with TAFE (the first 3 years with TAFE and the last with Murdoch) but there was not enough students to render it viable. Unfortunately for ECU, the idea has been put on hold rather than dropped.

In the current reorganization of faculties and courses at ECU, it looks like the 4 year BEd will remain for design and technology, with home ec and business moving to some kind of double degree structure, mainly because student numbers rendering these 2 areas barely viable as stand alone degrees. The numbers in design and technology are just adequate for viability, the intake for this year was 16 students, and last year we graduated 27, and the other years are somewhere within this range. In most years mature students, generally with a trade background, make up about 50% of the intake.

None of these numbers are able to satisfy demand, and the situation will get worse, particularly next year, which will represent the missing year for graduates as we moved from a 3 to a 4 year degree 3 years ago. The teaching population is bunched at the top end of the age spectrum, and with all current changes in learning area and outcomes, there is likely to be a spate of retirements over the next few years.

Apart from the BEd, ACU has a 1 year Dip Ed which has about 6 students in it each year who have a range of 1st degrees, and Masters and PhD Technology programs which are increasing in numbers each year. A significant boost to the Design and Technology area has been its international programs. A 4 year program concludes this year in Mauritius which has involved 27 design and technology teachers upgrading part time from a diploma to a degree. This has involved a mix of on-site and distance teaching. A second program began this year with a cohort of design and technology teachers from Botswana involved in a 2 year full time upgrade, again from diploma to degree status. This program will continue with future cohorts.

We have proposals being considered for groups of students in both Zimbabwe and South Africa for post graduate study in technology by distance.

Staffing is one of the most significant difficulties in the technology area at ECU, particularly in design and technology, being reduced from 5 full time to one full time lecturer in the last 4 years, resulting in a very heavy reliance on part time staff

Appendix III.

E-mail from Dr John Williams

describing technology teacher education at the Australian Catholic University

From: Dr John Williams pwilliam@earwig.ed.ac.cowan.edu.au
Date: Friday, 15 May 1998 15:12
To: Owen Cowley owen.cowley@avondale.edu.au
Subject: Technology Education at ACU (NSW)

NTTEC Colleagues,

Further to the summary of the situation in NSW is some information about the Australian Catholic University in Sydney courtesy of John Barlow.

TAS at ACU

We are finishing off the BEd(Secondary) program in TAS at the present time. This is a four year integrated program with 14 students in year 3 and 16 in year 4.

The BTeach/BA (Technology) program was introduced at the beginning of 1997. We have 22 Technology majors and 4 Technology minors in year 2. In year 1 there are about 52 Technology majors and approximately 40 minors. Students can also elect Technology as major/minor in the BA program, where we have about 6 Technology majors. Probably some of the 40 minors are doing a BA only.

The BTeach/BA program is essentially a wedge shaped 3+1 program in the sense that students take units for their BA award in years 1-3 with some Education units. Those students who get to the end of year 3 and decide they do not wish to teach can exit with a BA. Year 4 is strictly an Education year.

Appendix IV.

Letter from Dr Geoffrey Madigan

confirming the closure of the Bachelor of Education

(Industrial Technology and Design) program at Avondale College

Avondale College
DEGREES WITH A CAREER FOCUS

24 March 2000

Mr Ronald J Green
Watson Hall
AVONDALE COLLEGE

Dear Ronald

Further to the recent discussion between students in the Industrial Technology program and College Administration, this letter is to confirm the details concerning the future of the Industrial Technology Studies program.

Because of the financial position of the College and the need for the College to move to a more secure position for future development, College Council at its meeting on March 16, resolved that there be no further intake of students into the Industrial Technology program. This means that the program will be phased out as current students complete their studies.

We wish to assure you that the College is committed to enabling students already enrolled in the program to complete their studies, or to make such other arrangements as are necessary to enable them to complete their degree. It is our intention that the staff adjustments associated with the wind down of the program can be made in such a way that the teaching of the subjects is not disrupted unnecessarily. There may, however, need to be some re-sequencing of studies in order to enable students to complete their majors as staff adjustments are made.

As was discussed in our meeting on Monday, it may be possible to bring forward some of the subjects in the major sequence in order to avoid excessive difficulties with small class numbers at a later date. We will work with the Dean of the Faculty in identifying issues and alternatives so that as early as possible pathways and options will become clearer.

Students who have taken leave of absence from the program should note that they will need to resume their studies again no later than First Semester 2001 in order to ensure that they can complete their studies.

The College regrets the necessity of these developments but is committed to work with you to ensure that you are able to satisfactorily complete your course.

With kind regards

Yours sincerely

Geoffrey A Madigan
PRESIDENT
cc: Owen Cowley, Dean of Faculty; Des Cooke, Academic Registrar

ts

582 Freeman Drive PO Box 19 Cooranbong NSW 2265 Australia Telephone 02 4980 2222 Facsimile 02 4980 2115
Australasian Conference Association Limited ACN 000 005 939

Appendix V.

E-mail from Dr John Williams

describing technology teacher education in New South Wales

From: Dr John Williams pwilliam@earwig.ed.ac.cowan.edu.au
Date: Thursday, 14 May 1998 11:45
To: Owen Cowley owen.cowley@avondale.edu.au
Subject: Re: Tech teacher training in NSW

NTTEC Colleagues,

The following description of the technology teacher training situation in NSW is kindly supplied courtesy of John Gibson. Some of the information from institutions other than U Sydney is admittedly sketchy. I have tried to get more information from those institutions, but without success yet. As it comes I will pass it on. Thanks for the overview, John.

The situation regarding pre-service Technology Teacher Education in NSW, as far a I can ascertain, is as follows;

1. The University of Sydney offers a BTeach/MTeach program which follows an appropriate first degree. There are only two or three Technological and Applied Studies (TAS – the learning area) students in this program, but plans are underway to try and market the TAS side of the program to potential graduates from appropriate programs for the 1999 intake.

   The University has offered a retraining program for existing teachers to become technology teachers over the last two years, and a third program is to run this year. This program will commence in the middle of the year and run through semester 2 (contact for this is Marianne Hulsbosch).

   Following the decision to cease intakes into the BEd the University has a working party examining possibilities for a 'new' program, possibly involving TAFE, but no intake is expected before 2000.

2. University of Western Sydney (Nepean) has a graduate Dip. Ed (Secondary) which follows an appropriate first degree.

3. Charles Sturt University (Wagga) offers a four year BEd (TAS) with core studies in design, computing and materials technology. I understand some liaison with TAFE is used for the provision of some skills based work, but I have no specific detail. They also offer a Grad. Dip. Ed (TAS) which presumably follows an appropriate first degree.

4. Australian Catholic University has a Bed (TAS)/BTeach and a BA(Technology)/BTeach. I assume these are 2+2 programs, and I have heard that some 50 TAS places were taken up for this year. They also have a Dip Ed (TAS) and as far as I know there are some 9 DET sponsored students in the program this year.

5. The University of Newcastle has the BDesign/BTeach with a major in D&T and Ind. Tech. They also have a Dip. Ed (TAS).

   There is also developments at Newcastle relating to a program or programs, negotiated between various parties, to train potential redundant workers from BHP into Tech. Teaching. I understand that moves were made at the beginning of this year to commence a BEd (D&T) with about 50 in it, and also a DipEd.

6. Southern Cross Uni (Coffs Harbour). There appears to have been some negotiations going on between DET/TAFE and other parties wit a view to setting up a BEd (Tech) program at the Uni. An intake for 1999 seems to be on the agenda, but there is no confirmation of this.

This is very brief, but I hope it is of use.

Appendix VI.

Background information about technology teacher education programs at specified Australian universities/tertiary institutions

Avondale College

Avondale College is a Seventh-day Adventist Christian institution. It is open to students of various faith traditions and convictions who support the College's values. Eight different faculties offer undergraduate and postgraduate courses to students, the majority of whom come from Australia, New Zealand and the Pacific Islands, with a growing number from the United States of America. The Cooranbong campus of Avondale College is conveniently located close to Lake Macquarie and the NSW Central Coast beaches. Newcastle is the closest provincial city, and Sydney is only 60 minutes by train or freeway.

(Institutional Code: A)

AVONDALE COLLEGE
Art, Design and Technology

Home Economics/Design and Technology

This field of study is concerned with the well-being and development of people as individuals and as members of family groups interacting with their wider environments.

In this course you will have opportunity to explore and experiment in a very practical way in the areas of: food and nutrition; human development; life management studies; clothing and textiles; the built environment; design and technology, and vocational pathways.

HOME ECONOMICS/DESIGN and TECHNOLOGY SPECIALISATION

Design and Technology studies

DE100	Principles of Design
DE104	Applied Design II
DE101	Properties of Design Materials I
DE200	Computers in Design
DE202	Design in Technology
DE203	Creative Compositional Design II or
DE215	Creative Compositional Design IE
DE207	Creative and Applied Design II
DT200	Food Production Systems
DT250	Textiles Apparel Production Systems
DT300	Food Technology
DT320	The Built Environment or
DT360	Design Project
DT350	Textile Technology

Health and Family studies

CH123	General Chemistry
HO125	Socio-Cultural Studies
HO140	Food, Nutrition and Health
HO240	Nutrition Development and Performance
HO246	Family and Community Studies
HO321	Contemporary Family Issues
HO346	Social Nutrition and Health Promotion
MK210	Consumer Behaviour

Cognate studies for the Bachelor of Education - Primary may also be selected from this subject area.

LECTURING STAFF

G Grillmeier BEd, MA, Post GradCert Design and Tech (BA In progress); R Pearce BSc(Hons), DipNutrDiet, BA, PhD, MDAA, APD, G Perry BEd, MEdStud; L Butcher BEd, MEd, (PhD In progress), MIIA, MITEA; A Collis ATD, BA(Hons), MACE; O Cowley BEd, MAT, MIIA, MITEA; R Morris BEd, Grad Dip; N Peterson BEd, MEdStud.

CAREER OPPORTUNITIES

The Home Economics/Design and Technology specialisation is offered at Avondale College to meet the needs for educators within this field who are prepared to:

- teach the range of Home Economics/Design and Technology subjects within Seventh-day Adventist, state and other private secondary school systems in Australia.
- recognise and respond sensitively in an informed way to developments in the field of Home Economics/Design and Technology.
- work in associated non-teaching fields offered by industry.

For further information specific to this section contact the Program Coordinator: Gay Grillmeier Ph 02 4980 2160 b/h; 02 4977 2566 a/h; E-mail gay.grillmeier@avondale.edu.au; Fax 02 4980 2166 or the Enquiry Centre Ph 02 4980 2277 Toll Free 1 800 804 324

Canberra University

The University of Canberra occupies a site of 119 hectares in the suburb of Bruce, about eight kilometres from the central business district of Canberra. The principal aims of the University are to prepare students for professional careers, and to make a contribution to the intellectual development of Canberra and the south-east region, and to that of the nation.

(Institutional Code: B)

Design & Technology

BACHELOR OF EDUCATION (Secondary Teaching)

Course Enquiries
(02) 6201 5147
cecourses@comedu.canberra.edu.au

WEBSITE: comedu.canberra.edu.au Division of Communication and Education

Technology subjects are popular in schools and there is a strong demand for technology teachers. This course enables graduates with an undergraduate degree to teach a range of subjects, from Year 7 to 12 at tertiary entry level, in schools across Australia. Graduates will also be qualified to teach a range of vocational subjects that provide school students with industry qualifications.

Technology subjects in school's prepare students for the future - to be creative - to design, make and appraise products, systems and environments that are socially appropriate and meet needs. Design and Technology focuses on areas such as graphic design, environmental design, wearable design and product design. Other subjects that graduates will be able to teach include Construction Technology, Engineering Studies, Industrial Technology, Food Technology, Hospitality, Media Studies, Information Technology and Computing Studies.

Practical experiences in the application of design and technology comprise a significant component of the course. Pre-service teachers will develop an integrated approach to their practice of design and technology, developing competencies in a Technology Specialisation and, at the same time, skills of assessment as workplace assessors.

Admission

Applicants must meet the normal University of Canberra requirements for admission. Those who have worked in related industries, and are interested in becoming teachers, can study with recognition of prior learning.

Assumed Knowledge

It is assumed that all applicants have a level of competence in English adequate for study at university as well as a satisfactory level of mathematics.

Course Content

The course consists of Education Core subjects, a Major in a Design Core, a Major in a chosen Technology Specialisation and a Minor related to vocational practices in the chosen Technology Specialisation.

The six Education Core subjects are:

- Education Foundations
- Information Technology and Education
- Diversity in Educational Settings
- Responding to Individual Needs in Education
- Promoting Positive Learning Environments
- The Social Context of the Curriculum

and three Secondary Teaching Studies in Design and Technology, the Technology Specialisation, and Career and Enterprise Education.

A Major in a Design Core (articulated study at University of Canberra and at Canberra Institute of Technology) comprises:

- Design History & Research, Design Methods
- Design Communication
- Technologies and Management - Colour Studies, Furniture Design, Ergonomics, Materials & Building Technology, Design Technology
- Introduction to Media
- Design Culture
- Design Environment
- Design Studio (including an Integrated Design Project).

A chosen Technology Specialisation Major (at University of Canberra) and a Minor (at Canberra Institute of Technology) enable undergraduates to develop understanding and expertise, as follows:

ENGINEERING

- Physical Principles
- Electronic Engineering
- Engineering Management
- User-Centred Design
- Industrial Design

and

- Vocational Practices and Issues
- Workplace Assessor qualifications in Cabinet Making, and Engineering Production (Metals)

INFORMATION TECHNOLOGY

- Introduction to Information Technology
- Computing Mathematics
- Software Technology
- Files and Databases

and

- Vocational Practices and Issues
- Workplace Assessor qualifications in Information Technology

FOOD TECHNOLOGY

- Concepts in Biology
- Human Physiology and Anatomy
- Food and Consumer Science
- Nutritional Science
- Nutrition, Society and Health

and

- Vocational Practices and Issues
- Workplace Assessor qualifications in Hospitality Operations (Food and Beverage and Commercial Cookery)

Professional Experience

This course requires extensive experiential learning, or professional experience, in schools. This consists of 10 days in Years 1 and 2 and 25 days in each semester of Year 4. Students must make a full-time commitment during Professional Experience blocks and will need to make alternative arrangements for any part-time employment. A work placement in industry is a requirement of Vocational Practice for the chosen Technology Specialisation.

Professional Recognition

The Bachelor of Education (Secondary Teaching) course is fully accredited and recognised as a teaching qualification throughout Australia.

teached@comedu.canberra.edu.au

Southern Cross University

Southern Cross University has established campuses at Lismore, Coffs Harbour and Port Macquarie, and has ongoing relationships with the communities it serves. Another University campus is scheduled for completion at Tweed Heads at the beginning of 2002. Founded on a 25-year tradition of academic excellence, it is developing an international reputation for delivering high-quality courses, to provide students with the best opportunities available for career development and advancement in a wide variety of fields, ranging from science and the arts, to tourism and nursing.

(Institutional Code: C)

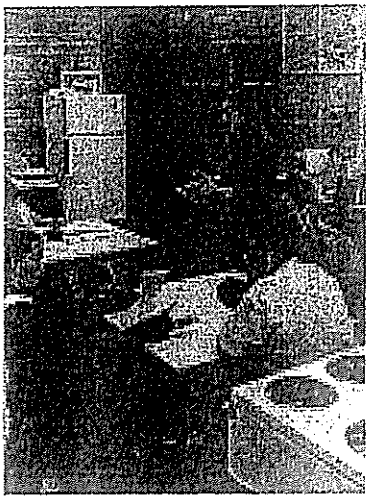
technology education
(secondary teaching)

8

Major study areas

All students complete a major in Design and Technology and a minor in Information Technology. In addition, students can select their study majors from the following:

- Information Technology and Multimedia
- Food Technology and Tourism Management
- Wood Technics and Engineering Studies



Elective units

Electives in our course provide you with an opportunity to expand or enrich your professional interests:

- Textiles and Design
- Psychology
- Social Science
- Resource Management
- Contemporary Music
- Visual Arts
- Computing
- approved TAFE studies

Southern Cross University

Edith Cowan University

Edith Cowan University has established three campuses within Perth (Churchlands, Mt Lawley and Joondalup) as well as one campus in Bunbury, 200 kilometres south of Perth. The University has positioned itself as a professionally oriented tertiary education institution providing service to and preparation for the "knowledge-based" service professions. In 2001, Edith Cowan University had more than 20,000 students undertaking study in over 160 courses at both undergraduate and postgraduate levels. In addition to Australian students, the University has more than 1,600 international students who originate from more than 60 countries.

(Institutional Code: D)

DESIGN & TECHNOLOGY @ EDITH COWAN UNIVERSITY

design

electronics

resistant materials

CAD/CAM

pedagogy

systems

graphics

photography

digital media

curriculum

philosophy

enterprise

UNDERGRADUATE

Bachelor of Education
Duration: 4 Years
Entry: Year 12 / Mature Age

Bachelor of Education
Duration: 2 Years
Entry: 2 Year Diploma

POSTGRADUATE

Diploma of Education
Duration: 1 Year
Entry: Degree in relevant area

Master of Education
Duration: 1 Year
Entry: 4yr Degree or equivalent
AVAILABLE BY DISTANCE

PhD
Part-time or Full-time
Entry: Good Honours / Masters

FURTHER INFORMATION

Dr P. John Williams
p.j.williams@ecu.edu.au
Phone: 61 8 9370 6847

John McQueen
j.mcqueen@ecu.edu.au
Phone: 61 8 9370 6271

Technology Education
Edith Cowan University
Bradford Street
Mt Lawley WA 6050
AUSTRALIA

EDITH COWAN UNIVERSITY
WESTERN AUSTRALIA

Griffith University

Griffith University has campuses located in Brisbane, Logan and the Gold Coast. It is dedicated to maintaining and developing educational courses of the highest quality that meet the needs of a changing society and enrich Queensland, Australia and the international community. Griffith University's commitment to academic excellence has set new benchmarks for education, both in Australia and overseas, and 3000 students from over 70 countries travel to Griffith to complete one of the 690 courses on offer to overseas students.

(Institutional Code: E)

The Bachelor of Technology Education

This four year program offers flexible career options in that students undertaking this program also have the opportunity to pursue studies which investigate the links between technology education, training and safety, and to select a second teaching area. This program has been developed to prepare technology educators to teach the current manual arts area in secondary schools and the emerging study of technology education.

Honours

Honours is available in this program and students are required to undertake specific study in their third and fourth years of the Bachelor of Technology Education. Honours courses are taken in place of a 10CP core course and 30CP of elective courses. Further details about the Honours program can be obtained from the Program Convenor.

General Information

Award Abbreviation:	BTechEd
Program Code:	**1056 (previously EDU108)**
Location:	MT GRAVATT campus
Host Faculty:	Faculty of Education
Host School:	School of Vocational, Technology and Arts Education
Program Duration:	4 years full-time
Total Credit Points:	320CP
Student Fees:	International
Contact:	Student Administration, Mt Gravatt campus
Program Convenor:	Mr Ivan Chester

Degree Requirements

To be eligible for the award of Bachelor of Technology Education (BTechEd), a student must acquire 320CP as prescribed below:

- gain 270CP for the prescribed Bachelor of Technology Education courses;
- gain 50CP for elective courses. Elective courses are currently available in the areas of vocational studies for secondary schools, and training and safety for industry; and
- gain no more than 40CP in courses in which the grade of *Pass Conceded (PC)* has been attained; and
- satisfactorily complete Professional Experience requirements, including school experience, supervised and assessed practice teaching and industry placement.

Professional Practice/Professional Experience Information

Students may not withdraw from professional practice/experience courses without approval. A student who withdraws from professional experience/practice will be given the grade of WF (withdrawal with failure) unless prior approval has been given by the Director Professional Practice Unit. A student who fails to undertake a professional experience/practice period in any semester for which it is required, according to the program structure, or who withdraws after the professional experience/practice period has commenced, will be given the grade of FNS (fail - no submission). Both grades WF and FNS are fail grades and are equivalent to the grade "Unsatisfactory" for the purposes of the Progression Rules.

Charles Sturt University

Charles Sturt University has campuses established in the fast-growing regional areas of Albury-Wodonga, Bathurst, Wagga Wagga and Dubbo. CSU delivers more than 300 courses to around 30,000 students throughout Australia and overseas. As well as being a centre for excellence in teaching and learning, CSU has established a number of award-winning commercial enterprises, including a farm, winery, cheese factory and equine centre, which provide a resource for teaching and research and gives students hands-on experience utilising the latest technology and equipment.

(Institutional Code: F)

Charles Sturt University: Bachelor of Education (Technology and Applied Studies)
Course information

- It would normally take you four years of full-time study or eight years of part-time study at the Wagga Wagga Campus to complete this course.
- The Technology and Applied Studies (TAS) Key Learning Area brings together subjects such as Agriculture, Food Technology, Computing, Design & Technology, Textiles and Industrial Arts.
- Importantly, in recent years vocational education has become part of the secondary school curriculum and the majority of vocational courses in schools are taught by teachers in the TAS area

On completion of this course you will be classed as a teacher of technology with the ability to teach in the Key Learning Area of Technology and Applied Studies.
Significant components of the course are available by distance education, allowing some flexibility in enrolment in the course.

About the course

Majors

You will complete a major study in one of:

- Agriculture;
- Computing; or
- Food Technology

Minors

You will complete a minor study in one of:

- Agriculture
- Computing
- Food Technology
- Industrial Arts

Credit

Prospective students with trade qualifications, textiles, computing, Agriculture backgrounds and experience in vocational training will get credit in this program.

Practical experience

Students undertake extensive practical experience in schools, culminating in a 10 week internship in their final year. Students are also expected to undertake an industry placement in the area of Vocational Education in which they specialise.

University of Newcastle

The University of Newcastle has an international reputation for expertise in innovative approaches to teaching and learning. With campuses in both Newcastle and Central Coast (NSW), it serves a 'catchment area' of approximately one million people. The larger campus at Callaghan lies about 12 kilometres from Newcastle's centre. The Central Coast Campus is a joint venture of The University of Newcastle, the Hunter Institute of Technology (TAFE NSW), and the Central Coast Community College (adult community education). It is located at Ourimbah, halfway between Newcastle and Sydney. In 2001, 150 undergraduate and postgraduate courses were on offer to more than 18,500 students.

(Institutional Code: G)

NewStart[1] in Teacher Education
"Innovation in Teacher Education"
A University of Newcastle Initiative

What Is "NewStart".

The NewStart Program refers to the initiative established by the University of Newcastle to offer entry into mainstream teacher education programs to people who have relevant content qualifications, but who do not have teacher training. Rather than require them to complete a full undergraduate teaching degree, the NewStart Program uses the Principle of Industry Recognition of Prior Learning to give applicants some credit on the content side of their teaching qualification.

Where Did It Start?

It started with BHP's announcement of the closure of steel making in Newcastle. The first cohort taken into the program 4 years ago included BHP workers who studied part-time under arrangements negotiated with BHP parallel to the closure of their Newcastle facilities.

The program very quickly expanded to include others of similar background in Newcastle and then Wollongong and soon in Sydney.

How Does It Work?

Entry to the program is by way of RPL (Recognition of Prior Learning) as with all other retraining programs at the University of Newcastle offered under the *NewStart in Teacher Education Retraining Program*. The University of Newcastle currently has 260 students retraining into teaching in its NewStart Program.

Pathways Into NewStart

1.For Those with Industry Backgrounds

An entry scale into the teacher education programs is worked out relative to the individual's qualifications and industry experience. There is a baseline RPL profile that is mandatory in order to be eligible for admission to a teaching qualification via the NewStart program.

Applicants must have demonstrated capacity and certification as follows:

- a minimum qualification attainment at the level of Certificate 3 trade qualification
- significant expertise in industry relevant to their prospective teaching area

demonstrated capacity and continued ability for life long learning. These elements make up the total profile mandatory for provision of RPL. The amount of RPL available depends on the individual's qualifications and industry experience.

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[1] The term *NewStart in Teacher Education Program* refers to the Retraining Programs with RPL entry that are offered at the University of Newcastle. RPL can come from Industry training and experience or from previous teacher training and experience.

2. For Those with Existing Teaching Qualifications
This is a new initiative which recognises previous teaching qualifications in the same way and then builds the new curriculum pathway into a new teaching area.

WHY IS IT INNOVATIVE

- Recognises that high level skills can be acquired through combinations of formal training and wide ranging context learning in the workplace
- The employer was prepared to Recognise Prior Learning for entry into teaching. This was historical.
- The program began as a partnership between three large institutions-the past employer, the future employer and the education provider. It was a significant partnership between three very large institutions who traditionally found it hard to change so quickly. This partnership was later to be recognised by a national award.
- Since the employer was paying all fees for the students the students were enrolled under the DETYA category of Employer Funded. A first for The University of Newcastle

NATIONAL AWARDS

The success and innovative nature of the New Start Program has been recognised through the receipt of two National Awards namely, the *Business/Higher Education Round Table (BHERT) Award for Outstanding Achievement in Collaboration in Education and Training (1998)* and *the Australian Award For University Teaching (1999).*

One of the fundamental philosophies for the NewStart Program is the need for students to have an integrated program of study that makes the connections between the content and the practice from the outset of the program. Wherever possible subjects studied provide opportunities to experience the profession of teaching in relationship to the material being studied. The course provides many and varied opportunities for students to reflect on the practice of teaching and all that that entails.

OTHER NATIONAL RECOGNITION

The program was selected as an example of innovative practice in the recent Site Based Teacher Education Project Commissioned by DETYA

INNOVATION IN DELIVERY

One of the characteristics of the program, which sets it apart from the usual teacher education programs is the close link between the new knowledge being developed and the practice of teaching and work with the profession. Students are involved with the classroom and practicing teachers very early in the program with some of the delivery being done by teachers in the school context.
Currently the majority of the offerings in the NewStart Program occur out of the Callaghan campus but with heavy involvement and teaching in satellite sites in local schools, TAFE and the Callaghan Collegiate.

In addition the Faculty has a very successful program at a satellite site at Keira Technology High School in Wollongong. This program operates in association with Wollongong University who deliver some of the general education content, the District Office and local schools in the district who deliver the specific curriculum content under the direction and in association with academics from The University of Newcastle

As well the Faculty has recently formed a partnership with the Fairfield District Office to develop a second satellite site in Sydney for the delivery of Science and Mathematics retraining programs.

WHAT ARE THE BENEFITS OF THE PROGRAM

The curriculum areas targetted by the program are currently experiencing acute teacher shortage. The NewStart program provides an opportunity for workers from other industries who seek a change of career direction with the opportunity to consider teaching as an option.
Penny Gilmour from The NSW Teachers Federation outlines the benefits as follows:

"The benefit to the employer is obvious- the provision of more teachers in areas of demand
The benefit to the University student is in an attractive career change option that maintains a rigorous standard.
The benefits for the University are that it is able to offer a new option to study, and increase its attractiveness to students, while being at the cutting edge of new ideas in teacher training and pedagogy
The benefits to the teachers in the system are the advent of more colleagues to teach in high-demand subjects, and the challenge and stimulation of the other experiences that these teachers bring to the teaching-learning environment
With places in the Newcastle Program in high demand and high demand for its graduates, it seems that everyone benefits from this initiative". Education, *March 19 2001*

Australian Catholic University

Australian Catholic University is a public university, funded by the Australian Government and is open to people of all religious beliefs or backgrounds. It is committed to a Catholic ethos and seeks to foster and promote teaching, research and scholarship in accordance with Christian principles and traditions. ACU has six campuses situated in Brisbane, Sydney (2), Canberra, Melbourne and Ballarat, with more than 10,000 students spread over these campuses. The university has a rapidly growing international student section with students from more than 35 countries presently enrolled. Through fostering and advancing knowledge in education, health, commerce, the humanities, the sciences and technologies, and the creative arts, Australian Catholic University seeks to make a specific contribution to its local, national and international communities.

(Institutional Code: H)

Bachelor of Teaching/ Bachelor of Arts

(Secondary-Humanities)
(Secondary-Mathematics)
(Secondary-Technology)
(Secondary-Visual Arts)

Strathfield - NSW (Mount St Mary Campus)

4 years full-time.

Approximately 15 - 20 class hours per week.

This dual degree is designed for those intending to become teachers in secondary schools. It also provides considerable career flexibility. ACU education graduates are highly regarded by employers because of the academic rigour of the Bachelor of Arts and the extensive teaching practice involved in this course.

The course has as its foundation the conviction that the quality of education in a society is closely associated with the preparation of teachers. Their professional expertise, attitudes and values equip them to develop in others sound knowledge, skills and ideals and a capacity and readiness to undertake responsibility in the community. Quality of education depends also on teachers being prepared to meet the challenge of continued growth in knowledge, accelerating technological development, social change and heightened community expectations.

Inclusion of Religious Studies and Religious Education units will enable students to gain accreditation to teach Religious Education in NSW schools.

Application

All applicants should refer to the 'How to Apply' section in the front of this guide for detailed application requirements.

Apply to UAC. These courses are separate entries in the UAC Guide and have individual UAC course codes.

Prerequisites

Humanities and Technology
Nil.

Mathematics
Assumed Knowledge: Mathematics.

Visual Arts
Recommended Studies: Visual Arts.

Course Outline

Students are required to complete a total of 32 units including:

Arts Sequences (16 units)
- a major teaching subject (ie Humanities, Mathematics, Technology, Visual Arts)
- a minor second teaching subject (a second teaching subject selected from a BA Sequence)
- a minor sequence

Professional Studies (8 units)
- teaching studies units
- curriculum studies units

Education Studies (8 units)
- a major sequence in Education Studies

Major Teaching Subjects

- **Humanities**

Students choose one major sequence in either Economics, Geography, History, Literature or Theological Studies.

- **Mathematics**

Students choose a major sequence in Mathematics from the Bachelor of Arts.

- **Technology**

Students choose a major and minor sequence in Design and Technology. *This specialisation is currently under review.*

- **Theological Studies**

Students choose a humanities major sequence and two minor sequences in Theological Studies.

- **Visual Arts**

Students choose a major sequence in Visual Arts.

Minor Second Teaching Subjects
Students choose a second teaching subject from an Arts minor sequence for which the corresponding curriculum studies units are available.

Minor Sequence
Students choose a minor sequence which may be used to:
- extend the major sequence
- extend the minor sequence into a major sequence in theological studies
- provide another minor sequence.

Note: All teaching subject combinations are dependent upon timetable and quota availability, and the offerings may vary from year to year.

Teaching Studies
Units address the understanding, issues and skills associated with teaching and learning: classroom management and classroom communication. These units include field experience components which are taken in Years 2, 3 and 4 of the course and include a community outreach program, a school practicum and an internship.

Curriculum Studies
Units cover the curriculum in the major and minor teaching areas selected. Curriculum and Teaching Studies units occur in the third and fourth year of the course, eg History Curriculum and Teaching.

Education Studies
Students are required to study eight units:
Catholic Education & Schooling OR Education & Society
Human Development
Indigenous Cultures & Peoples OR Race & Racism in Australian Educational Contexts
Language, Community Contexts & Empowerment
Learning
Professional Ethics in Education
Technology & Learning
plus one Social Justice elective.

Professional Recognition

Graduates are eligible for teacher registration and accreditation to teach in Catholic, state and independent schools.

Career Opportunities

Graduates in teaching are sought by employers such as Catholic, private, and government schools, Department of Education and Training, Commonwealth Department of Education, Training and Youth Affairs and private colleges.

Appendix VII.

Information about the technology teacher education program at the University of Western Sydney

University of Western Sydney

University of Western Sydney commenced its B.Ed. (Secondary Technology) in 2001. During 2001, UWS was undergoing major restructuring with every education course being reviewed, including the brand new B.Ed. (Secondary Technology). As a result, new information is expected to become available on their website and from any of its Campus Service Centres sometime in the near future. The students enrolled in the B.Ed. (Secondary Technology) during 2001 will change to the revised course in 2002. Essentially, it has been a 'repackaging' of existing Education, Engineering Design, Business and IT units. It is the aim of the program to prepare graduates to teach Design and Technology and at least two TAS electives such as Industrial Technology, Engineering, Technics and Technical Drawing. It is also planned that other TAS specialisations will be offered in the future.

Bachelor of Education (Secondary Technology)

UAC Code **707500**
4 years full time study at Penrith

Entry requirements

Assumed knowledge: at least two units of HSC English and two units of mathematics, and a demonstrable interest in technology and applied studies.

You need to have completed at least two units of English and two units of mathematics in the HSC to teach in NSW government schools (NSW Department of Education and Training requirement). You need to reach this level in both subjects before completing your degree if you have not already done so. Some elective units may assume knowledge of HSC mathematics.

Careers

This program prepares students to be secondary teachers in the key learning area of technology and applied studies (TAS), specifically in the areas of design and technology and either engineering studies or technics/industrial technology. TAS teachers are currently in extremely high demand in NSW.

About this course

This course provides you with a broad experience across a number of areas of design and engineering. In addition, it provides understanding of adolescents, society and schools, and the essential teaching skills, strategies and knowledge relevant to teaching in technology and applied studies.

Make a course enquiry

Search for courses:

Search by:
course name ◉ | course information ○ | UAC code ○

Appendix VIII.

Information about the technology teacher education program at the University of Sydney

University of Sydney

University of Sydney anticipated the commencement in 2001 of a new undergraduate degree, Bachelor of Education (Secondary: Design and Technology), however during the first year of the degree, students study at various TAFE colleges around NSW and therefore unavailable for this study.

The Faculty of Education of the University of Sydney and TAFE have cooperated in the development and teaching of the new Bachelor of Education (Secondary: Design and Technology) Degree.

This exciting new degree provides for students to undertake studies in Education within the University as well as completing two Level 4 Certificates within TAFE; thus preparing students to teach Design and Technology as well as either Food Technology/Hospitality or Information Technology studies at secondary schools.

With a chronic shortage of teachers within Design and Technology areas of study, the partnership between the University and TAFE, fully endorsed by the Department of Education and Training, allows prospective teachers to be prepared in a most diverse, professional way. The strong links forged between the two institutions capitalise on the educational strength of the University and the extremely high standards and practical nature of TAFE training in the area of design, food technology and information technology, providing the students with the best of both worlds.

The unique combination of University of Sydney and TAFE qualifications offers more diversified education and training with the following features of this specific Degree:

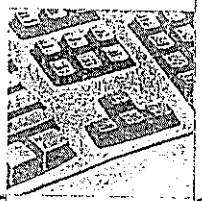
- provision for students to undertake studies in Education and completion of two Level 4 Certificates at TAFE. Either Information Technology (Client Support) or Hospitality (Catering Operations) during Year 1, and Design Fundamentals (Applied Studies) at Sydney Institute during Years 2 and 3
- flexible modes of entry
- graduates would be qualified to teach in the existing areas of Technological and Applied Studies as well as in the new field of Vocational Education and Training (VET)
- an extended internship in Year 4 of the program, taken in association with a Graduating Design Project.

Technology subjects prepare students for the future to be pro-active and creative, to design and make products and systems that meet needs and are socially and environmentally appropriate.

Computing

- Multimedia
- Information technology
- Designing software
- The Internet
- Computers

Students learn to design, develop, evaluate and modify computer-based systems. They use application software and undertake projects to solve computer-based problems.



Food

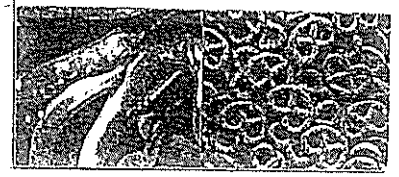
- Food preparation
- Nutrition
- Hospitality
- Food Science
- Food product development
- Marketing
- Food manufacturing

Students apply theoretical understandings to the presentation of foods for diverse situations and needs. They learn about the importance of food to the well being of the individual and the future of Australia.

Design

- Product design
- Engineering
- Construction
- Technical drawing
- Textile design
- Graphic design

Students investigate technology through design projects, thus learning about the factors, which contribute to successful design and production. Students develop skills in the areas such as fashion and textile design, industrial design and graphic design.



Appendix IX.

Avondale College

Human Research Ethics Committee -

principles of ethical conduct guidelines

AVONDALE COLLEGE
HUMAN RESEARCH ETHICS (HRE) COMMITTEE

PRINCIPLES OF ETHICAL CONDUCT

Reference

National Health and Medical Research Council. (1999). *National Statement on Ethical Conduct in Research Involving Humans.* Canberra: (pp. 11-14).

Copies of this book are available in the libraries: Cooranbong Campus – Call No. 174.28N21; Wahroonga Campus – Call No. 18.2/NHMR/1999.

The primary purpose of this Statement of ethical principles and associated guidelines for research involving humans is the protection of the welfare and rights of participants in research. The ethical and legal responsibilities which researchers have towards participants in research reflect basic ethical values of integrity, respect for persons, beneficence and justice. The responsibilities set out below accord with accepted moral and scientific principles set out in declarations, conventions and guidelines listed in Appendix 1. The principles in 1. Principles of Ethical Conduct are intended to apply to the interpretation and the use of all subsequent parts of this Statement.

INTEGRITY, RESPECT FOR PERSON, BENEFICENCE AND JUSTICE

1.1 The guiding value for researchers is integrity, which is expressed in a commitment to the search for knowledge, to recognised principles of research conduct and in the honest and ethical conduct of research and dissemination and communication of results.

1.2 When conducting research involving humans, the guiding ethical principle for researchers is respect for persons which is expressed as regard for the welfare, rights, beliefs, perceptions, customs and cultural heritage, both individual and collective, of persons involved in research.

1.3 In research involving humans, the ethical principle of beneficence is expressed in researchers' responsibility to minimise risks of harm or discomfort to participants in research projects.

1.4 Each research protocol must be designed to ensure that respect for the dignity and well being of the participants take precedence over the expected benefits to knowledge.

1.5 The ethical value of justice requires that, within a population, there is a fair distribution of the benefits and burdens of participation in research and, for any research participant, a balance of burdens and benefits. Accordingly, a researcher must:

(a) avoid imposing on particular groups, who are likely to be subject to over researching, an unfair burden of participation in research;

(b) design research so that the selection, recruitment, exclusion and inclusion of research participants is fair, and

(c) not discriminate in the selection and recruitment of actual and future participants by including or excluding them on the grounds of race, age, sex, disability or religious or spiritual beliefs except where the exclusion or inclusion of particular groups is essential to the purpose of the research.

1.6 The proportion of burdens to benefits for any research participant will vary. In clinical research, where patient care is combined with an intent to contribute to knowledge, the risks of participation must be balanced by the possibility of intended benefits for the participants. In other research involving humans that is undertaken solely to contribute to knowledge, the absence of intended benefits to a participant should justly be balanced by the absence of all but minimal risk.

CONSENT

1.7 Before research is undertaken, whether involving individuals or collectivities, the consent of the participants must be obtained, except in specific circumstances defined elsewhere in this Statement [see paragraphs 1.11, 6.9, 14.4, 15.8, 16.13].

(a) provision to participants, at their level of comprehension, of information about the purpose, methods, demands, risks, inconveniences, discomforts, and possible outcomes of the research (including the likelihood and form of publication of research results); and

(b) the exercise of a voluntary choice to participate.

Where a participant lacks competence to consent, a person with lawful authority to decide for that participant must be provided with that information and exercise that choice.

1.8 A person may refuse to participate in a research project and need give no reasons nor justification for that decision.

1.9 Where consent to participate is required, research must be so designed that each participant's consent is clearly established, whether by a signed form, return of a survey, recorded agreement for interview or other sufficient means.

In some circumstances and some communities, consent is not only a matter of individual agreement, but involves other properly interested parties, such as formally constituted bodies of various kinds, collectivities or community elders. In such cases the research needs to obtain the consent of all properly interested parties before beginning the research.

1.10 The consent of a person to participate in research must not be subject to any coercion, or to any inducement or influence which could impair its voluntary character.

1.11 It is ethically acceptable to conduct certain types of research without obtaining consent from participants in some circumstances, for example, the use of de-identified data in epidemiological research, observational research in public places, or the use of anonymous surveys. [See 14. Epidemiological Research and 17. Research Involving Deception of Participants, Concealment or Covert Observation.]

1.12 A participant must be free at any time to withdraw consent to further involvement in the research. If any consequences may arise from such withdrawal, advice must be given to participants about these before consent to involvement in the research is obtained.

RESEARCH MERIT AND SAFETY

1.13 Every research proposal must demonstrate that the research is justifiable in terms of its potential contribution to knowledge and is based on a thorough study of current literature as well as prior observation, approved previous studies, and where relevant, laboratory and animal studies.

1.14 All research proposals must be so designed as to ensure that any risks of discomfort or harm to participants are balanced by the likely benefit to be gained.

1.15 Research must be conducted or supervised only by persons or teams with experience, qualifications and competence appropriate to the research. Research must only be conducted using facilities appropriate for the research and where there are appropriate skills and resources for dealing with any contingencies that may affect participants.

ETHICAL REVIEW AND CONDUCT OF RESEARCH

1.16 Research projects involving humans must be reviewed by a Human Research Ethics Committee (HREC) and must not be undertaken or funded unless and until approval has been granted.

1.17 A researcher must suspend or modify any research in which the risks to participants are found to be disproportionate to the benefits and stop any involvement of any participant if continuation of the research may be harmful to that person.

1.18 The results of research (whether publicly or privately funded) and the methods used should normally be published in ways which permit scrutiny and contribute to public knowledge. Normally, research results should be made available to research participants.

1.19 Where personal information about research participants or a collectivity is collected, stored, accessed, used, or disposed of, a researcher must strive to ensure that the privacy, confidentiality and cultural sensitivities of the participants and/or the collectivity are respected. Any specific agreements made with the participants or the collectivity are to be fulfilled.

1.20 Where the records and results of research contain information of clinical significance it is the responsibility of both the researcher and the institution or organisation to maintain the security and storage of records and results so as to enable any necessary follow-up studies to be carried out.

1.21 Where research is conducted in an overseas country under the aegis of an Australian institution or organisation, the research must comply with the requirements of this Statement as well as the laws and guidelines of that country.

Appendix X.

Covering letter

What Influences People to Enrol as Undergraduates in Technology Teacher Training at Tertiary Institutions?

Dear Student,

My name is Ron Green and I am currently in my final year studying BEd Industrial Technology and Design (Honours) through Avondale College.

My Honours research is looking into undergraduate students who are being trained to be Technology teachers throughout Australia. As you are aware, graduate teachers in these areas are highly sought after all over Australia.

The data gathered from this survey will be used to locate major influences that encourage Australians to enrol in undergraduate studies within the Technology Education field. If trends can be established, it will then be possible to put forward recommendations as to the best methods to increase undergraduate numbers at your institution and across Australia.

With all research, it is important to receive back the maximum number of surveys possible in order for the data to be accurate, so we are requesting that you hand in this survey as soon as possible so it can be forwarded to back to me.

We do not need to know who you are, so please **DO NOT** write your name on the survey. The results of this survey will be held in strict confidence and since we don't know who you are, your identity cannot be revealed.

Thank you very much for taking the time to assist.

Ron Green

Appendix XI.

Survey (Questionnaire)

SURVEY

Influencing Factors

Please circle the number that describes the level of influence each statement has had on your decision to become a technology teacher.

1 = minimal influence 4 = very large influence

1 2 3 4	Personal interests or hobbies prior to tertiary enrolment.
1 2 3 4	Personal interests or hobbies after tertiary enrolment.
1 2 3 4	I enjoyed secondary school technology course(s).
1 2 3 4	I admired a high school technology teacher as a role model.
1 2 3 4	I was encouraged by high school principal.
1 2 3 4	I was encouraged by high school technology teacher.
1 2 3 4	I was encouraged by high school guidance counsellor.
1 2 3 4	I was encouraged by high school teacher (other than the teachers mentioned above).
1 2 3 4	I was encouraged by high school classmates.
1 2 3 4	I was encouraged by parents.
1 2 3 4	I was encouraged by other relatives.
1 2 3 4	I was encouraged by university technology education lecturer.
1 2 3 4	I was encouraged by other university personnel.
1 2 3 4	I was encouraged by other adults (non-university).
1 2 3 4	I was encouraged by college/university students.
1 2 3 4	I was encouraged by a community professional.
1 2 3 4	I was encouraged by other community personnel.
1 2 3 4	I was encouraged by church leader.
1 2 3 4	I was encouraged by youth organisation leader.

1 2 3 4	Previous teaching experience (e.g. another field).
1 2 3 4	Business or industry personnel encouraged me.
1 2 3 4	Retraining from industry for job security.
1 2 3 4	Increased likelihood of employment upon completion.
1 2 3 4	I saw a television advertisement about Technology teaching.
1 2 3 4	I like teaching others special skills.
1 2 3 4	I like working with high school students.
1 2 3 4	I enjoy creating and assisting others to create.
1 2 3 4	I wanted to be a teacher.

Socio-economic Background

Which category below is the **nearest** description to the primary occupation of the listed members of your family? (Tick the appropriate box)

	Your Mother or Female Care-giver	Your Father or Male Care-giver
Unemployed	☐	☐
Home Duties	☐	☐
Labourer, Cleaner, Aid or Shop Assistant	☐	☐
Driver, Machinery or Plant Operator	☐	☐
Skilled Tradesperson (e.g. Carpenter), Clerk or Secretary	☐	☐
Computer Programmer, Certified Nurse, Teacher	☐	☐
Middle Manager	☐	☐
Farmer or Owner of a Small to Medium sized Business	☐	☐
Owner or Manager of a Large Business which has many employees	☐	☐
University Lecturer, Engineer, Architect or Vet	☐	☐
Doctor, Solicitor or Senior Executive of a large company like BHP	☐	☐

Demographics

Gender ___ Male ___ Female

Age _____

Do you consider yourself being from the country? ☐

OR

Do you consider yourself being from the city? ☐

What year level are you beginning this year? 1 ☐ 2 ☐ 3 ☐ 4 ☐

Education

What degree are you studying? (e.g. BEd Technology and Applied Studies)

_____

What is your major field of study? (e.g. Computing Studies)

_____

What is your minor field of study? (e.g. Agriculture)

_____

What was the highest level you completed in secondary school? (e.g. Year 9)

_____

What year did you complete this level?

_____

In secondary school, what year levels were you involved in technology education? (tick the appropriate answer)

- ☐ Never
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10
- ☐ 11
- ☐ 12
- ☐ All high school

Grade level in which you first became interested in becoming a technology teacher. (tick the appropriate answer)

- ☐ Primary School
- ☐ High School
- ☐ TAFE
- ☐ Out-of-school
- ☐ University

What study or work did you do prior to enrolling to become a technology teacher? (tick the appropriate answer)

- ☐ Secondary School
- ☐ TAFE

(please specify course, certificates, diplomas)

_____

- ☐ University

(please specify course and degrees)

_____

- ☐ Work

(please specify occupation) _____

- ☐ Other (please specify) _____

-- END --